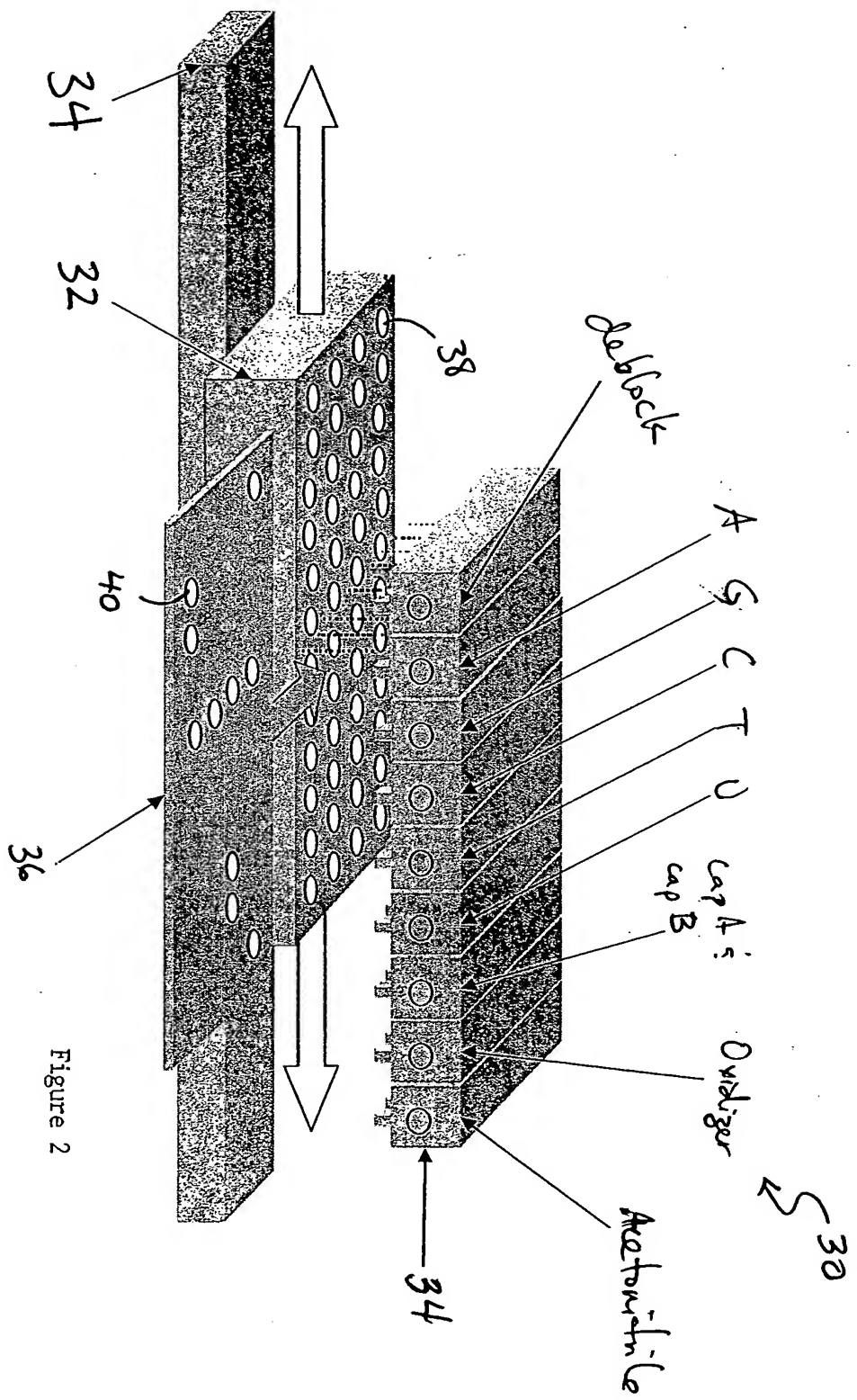


Figure 1



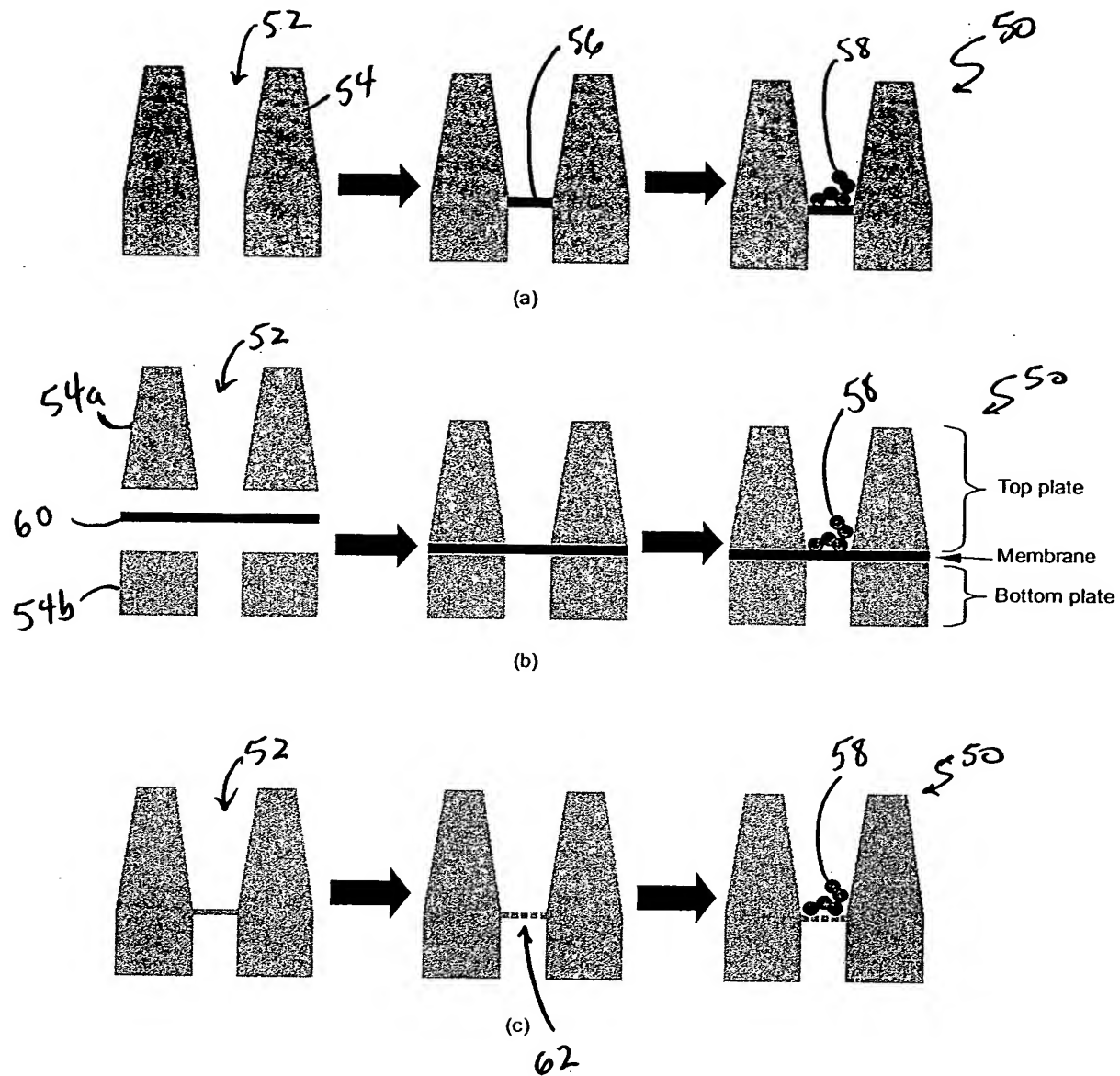


Figure 3

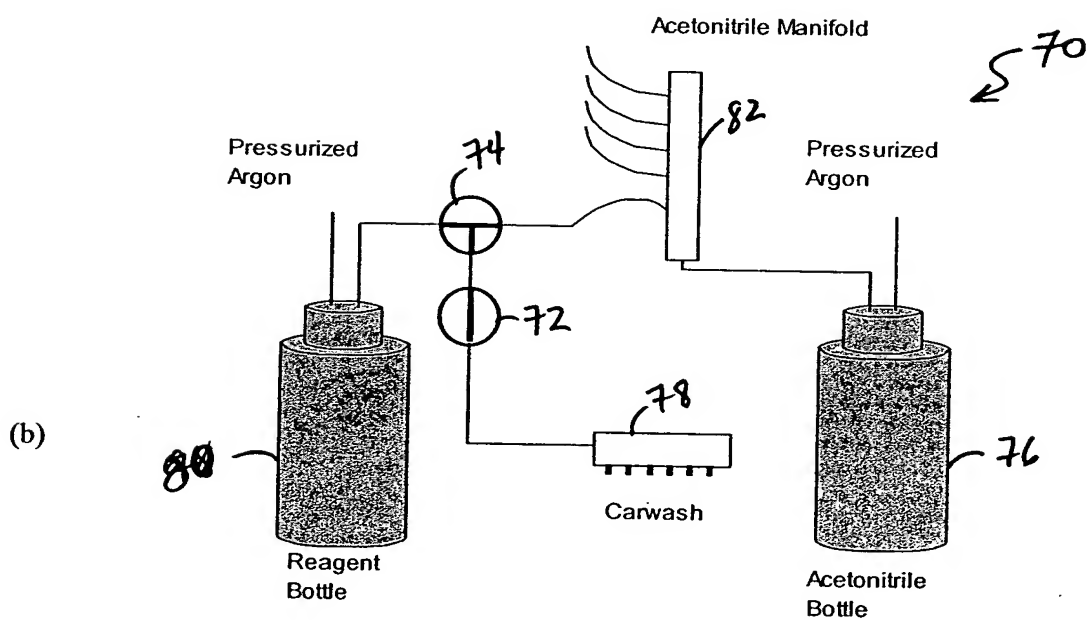
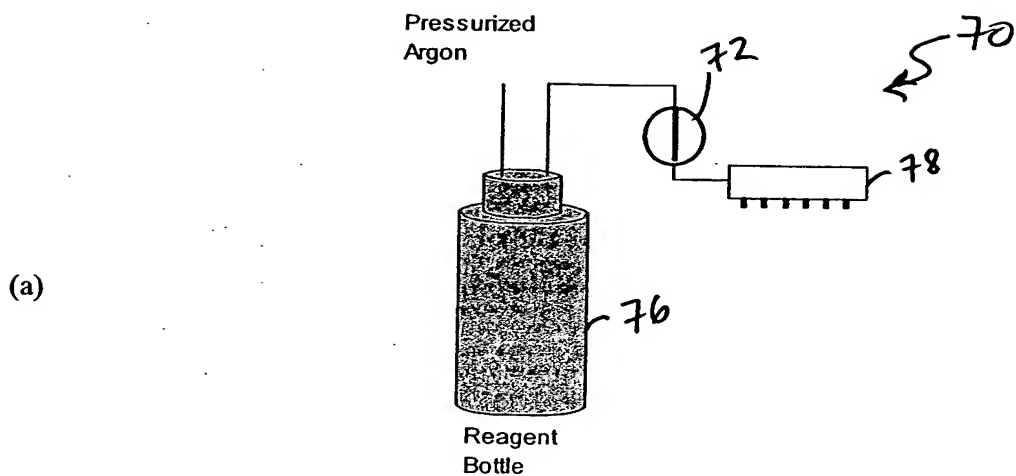


Figure 4

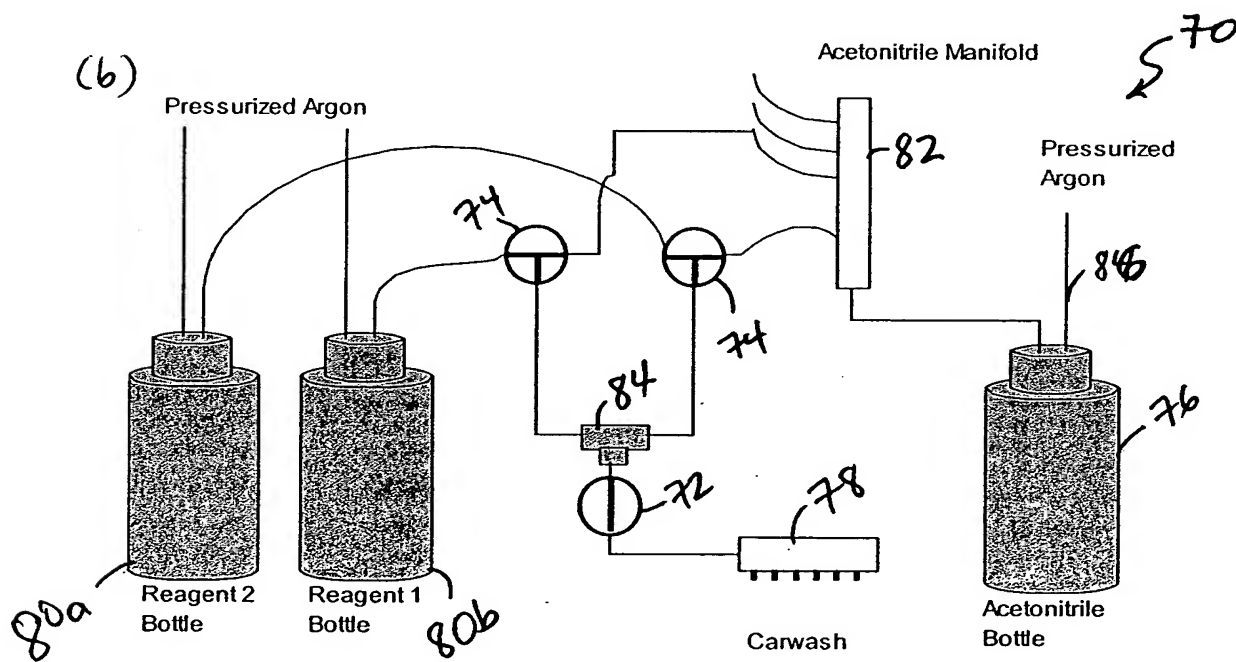
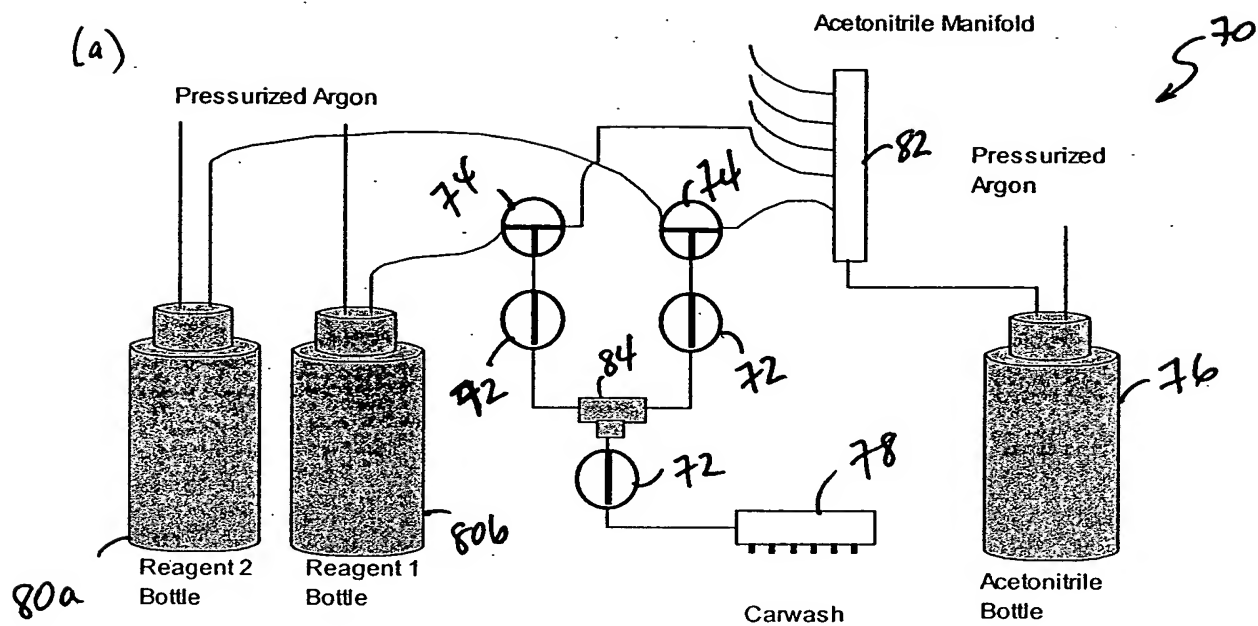


Figure 5

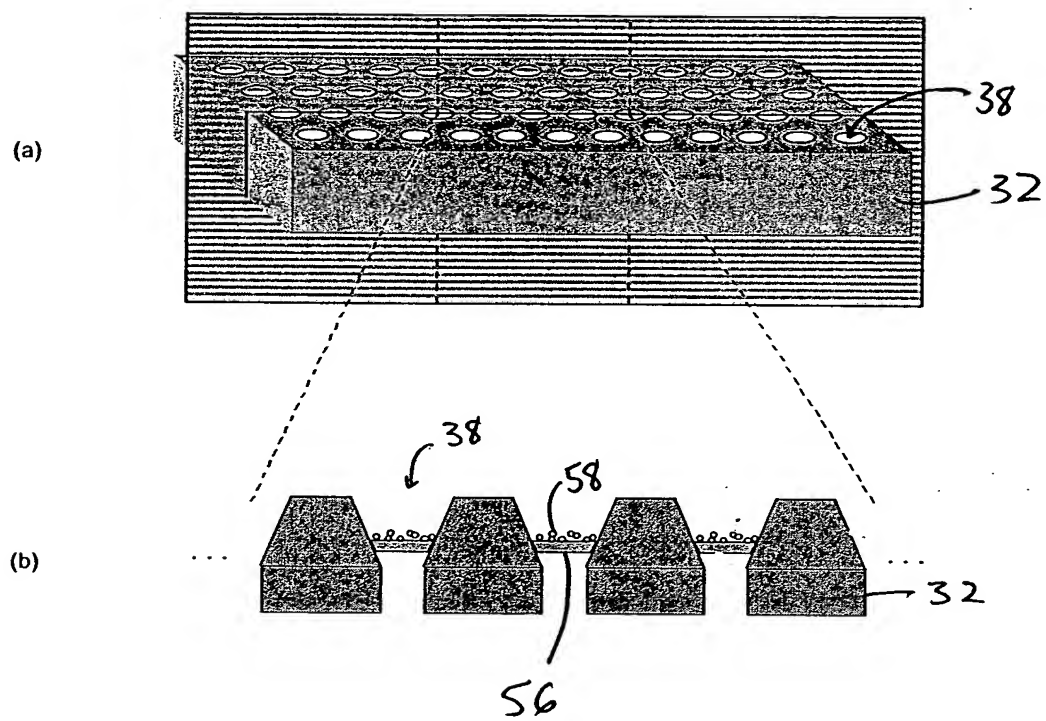


Figure 6

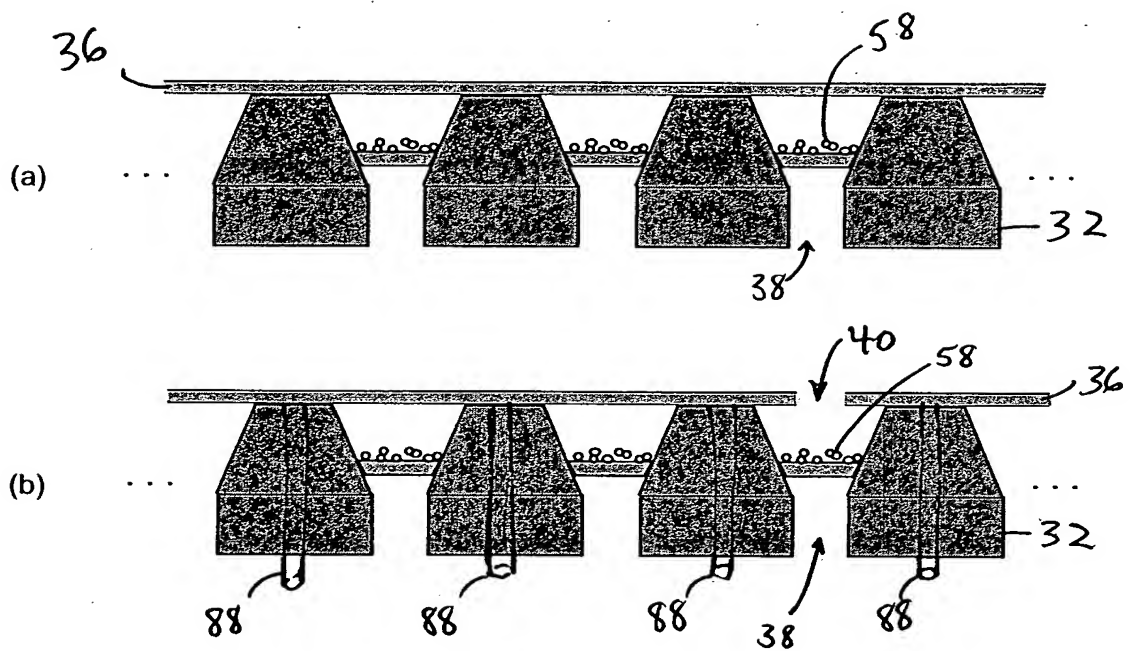


Figure 7

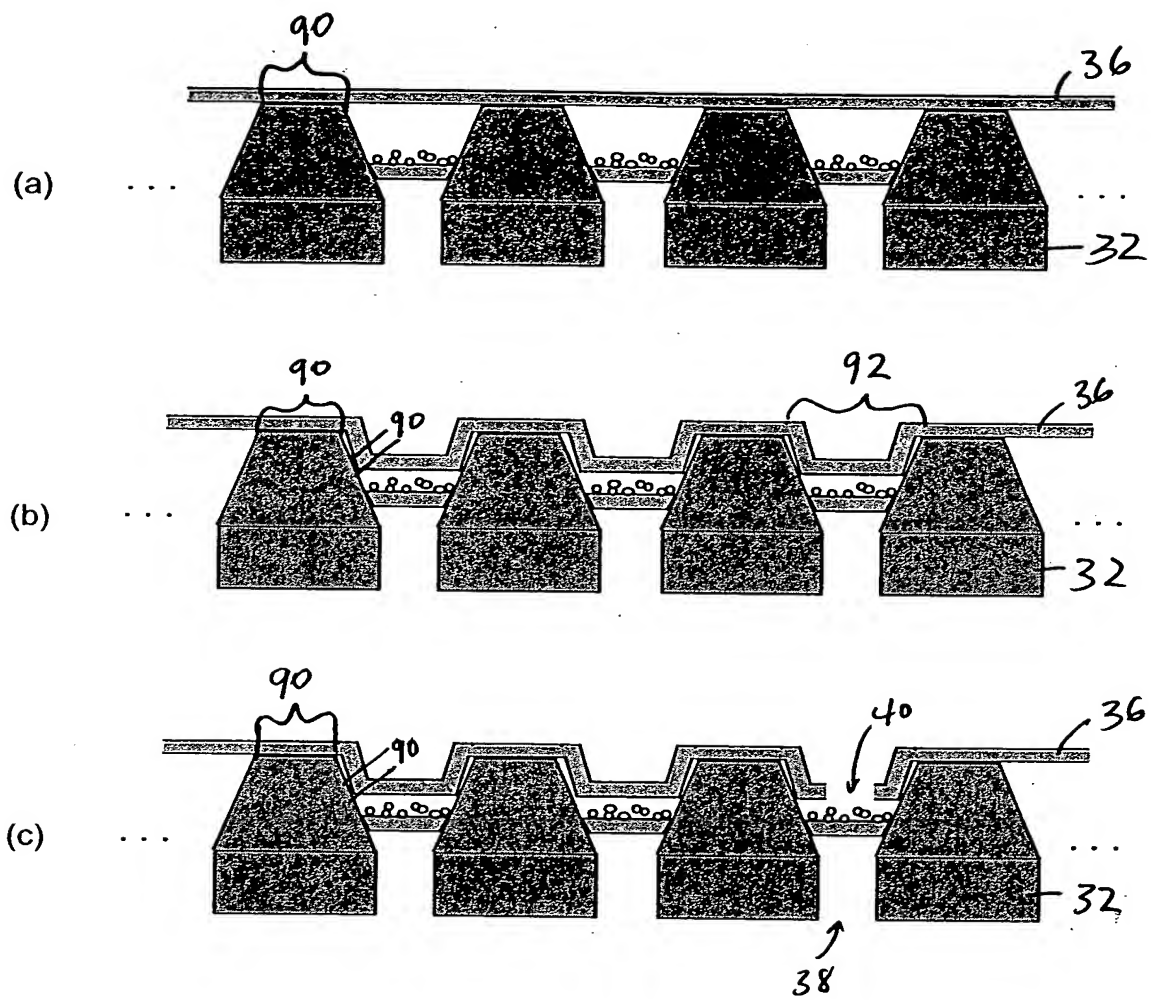


Figure 8

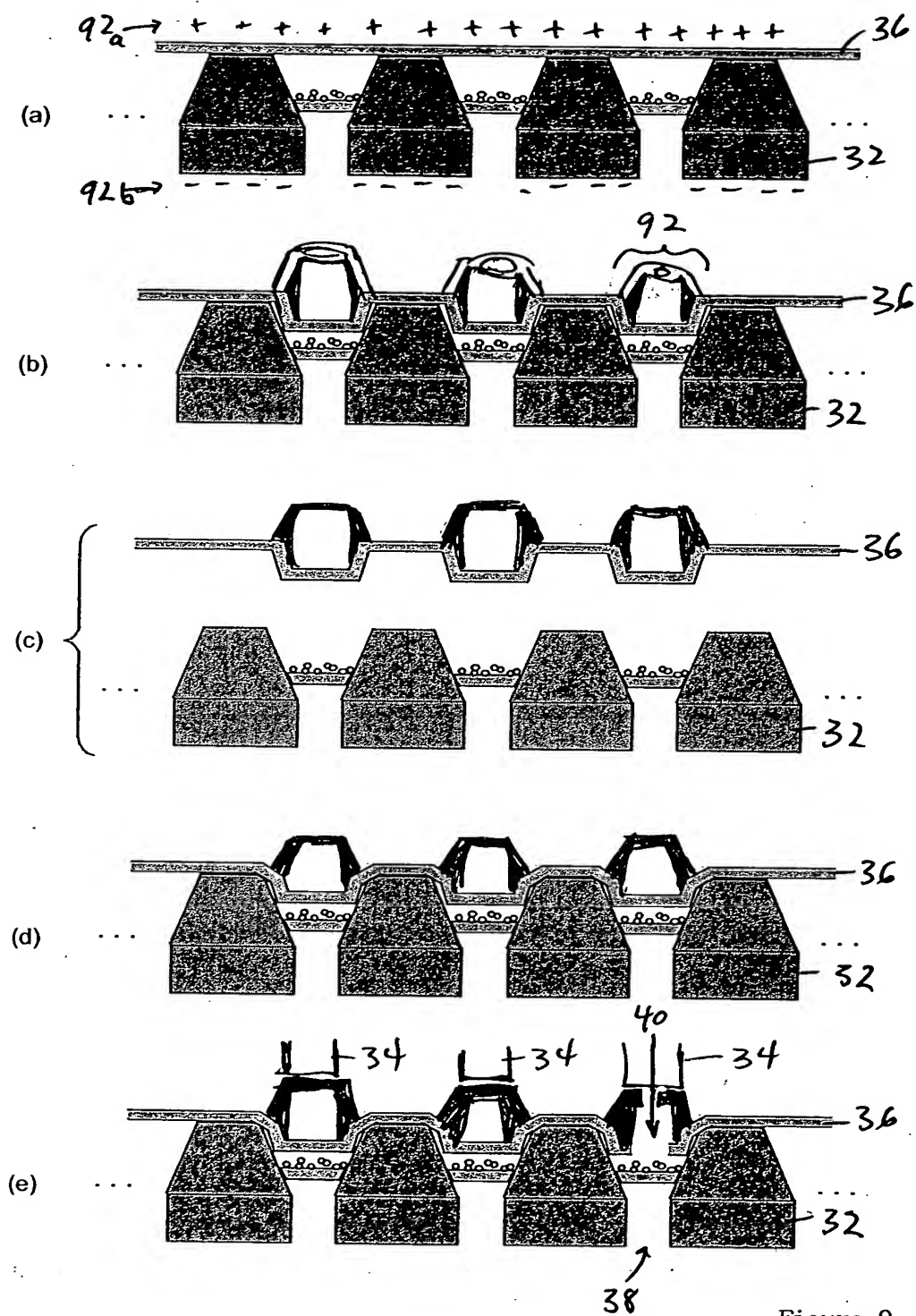


Figure 9

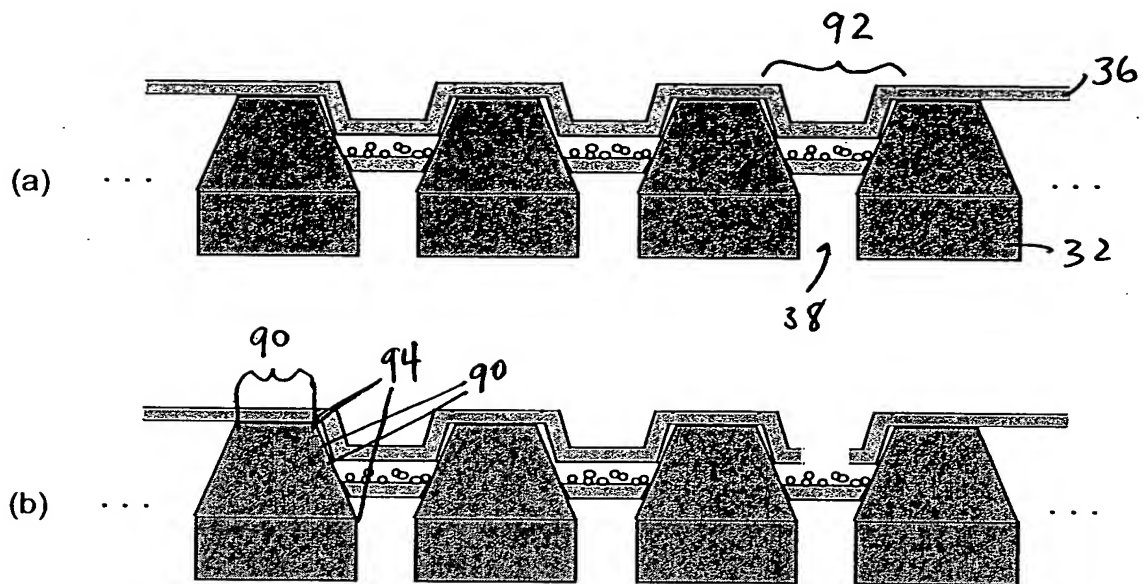


Figure 10

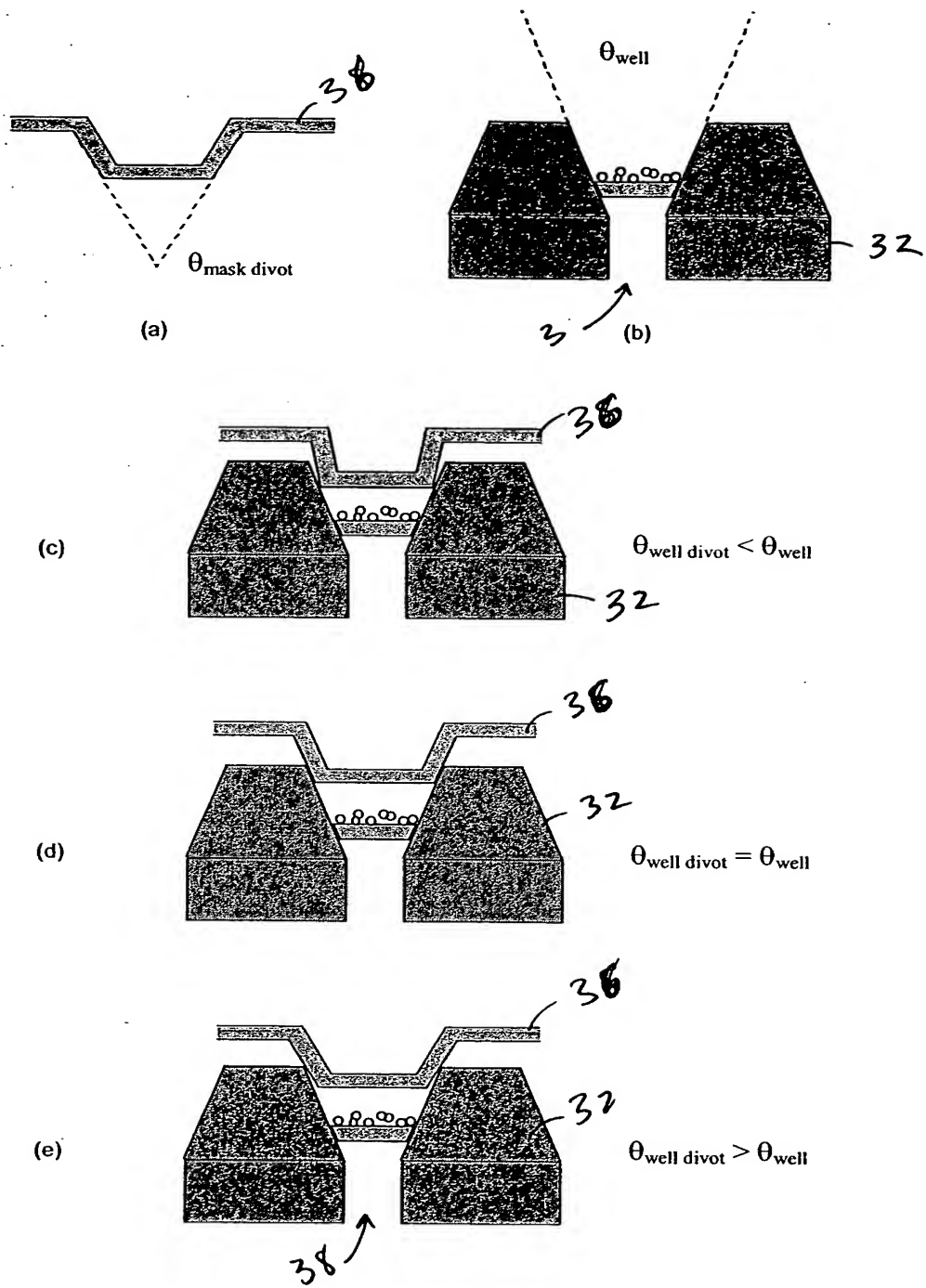


Figure 11

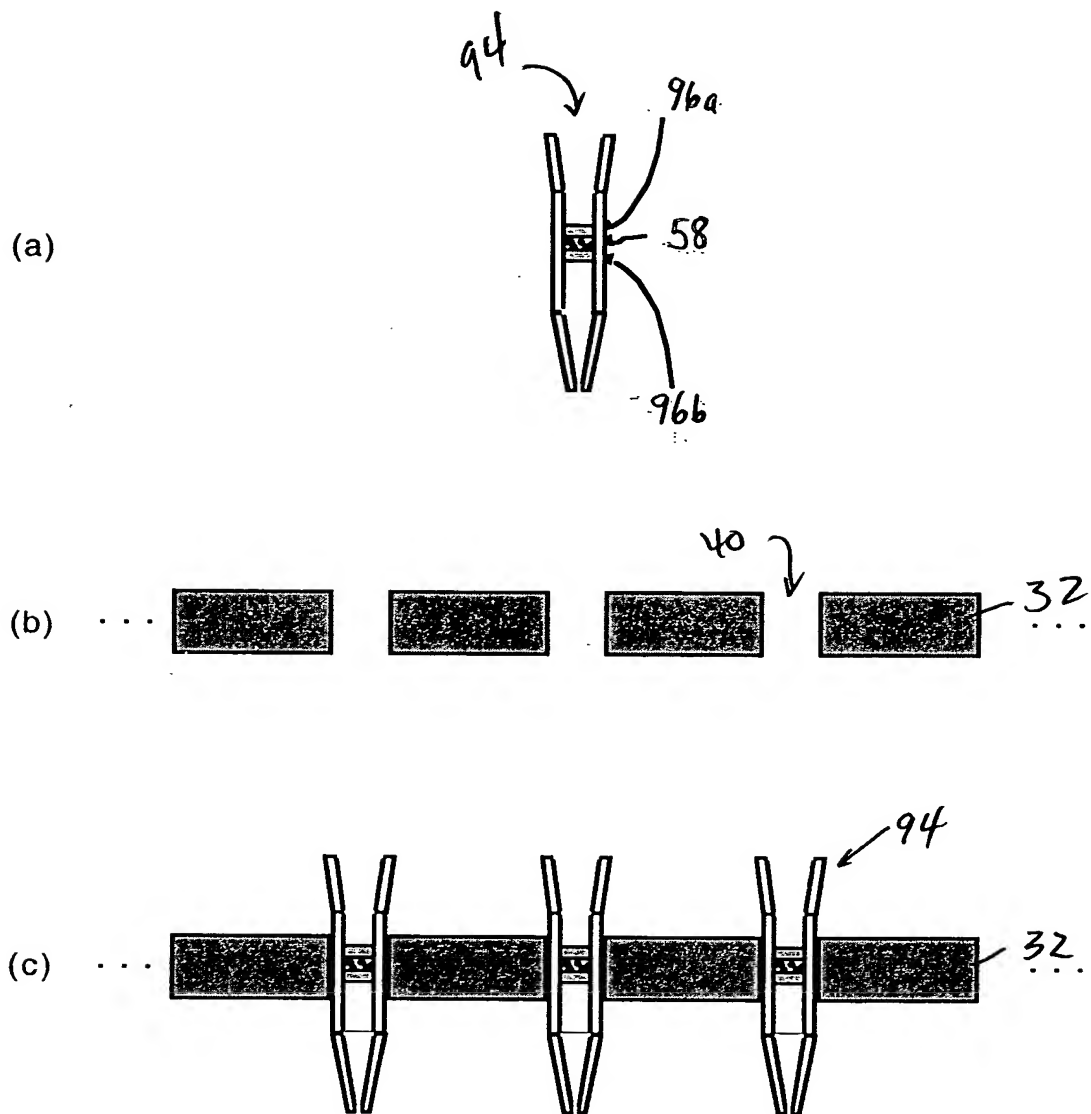


Figure 12

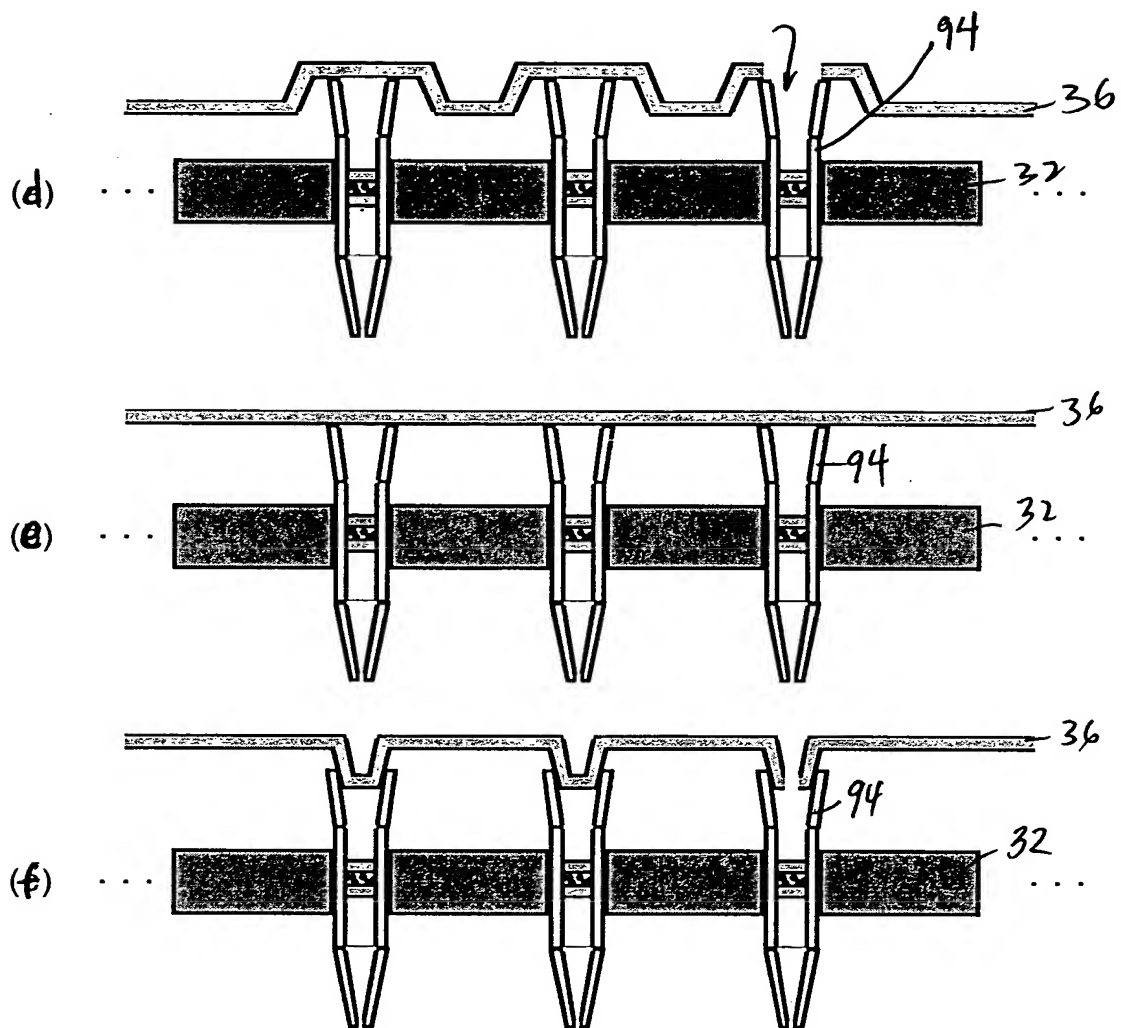


Figure 12 (cont.)

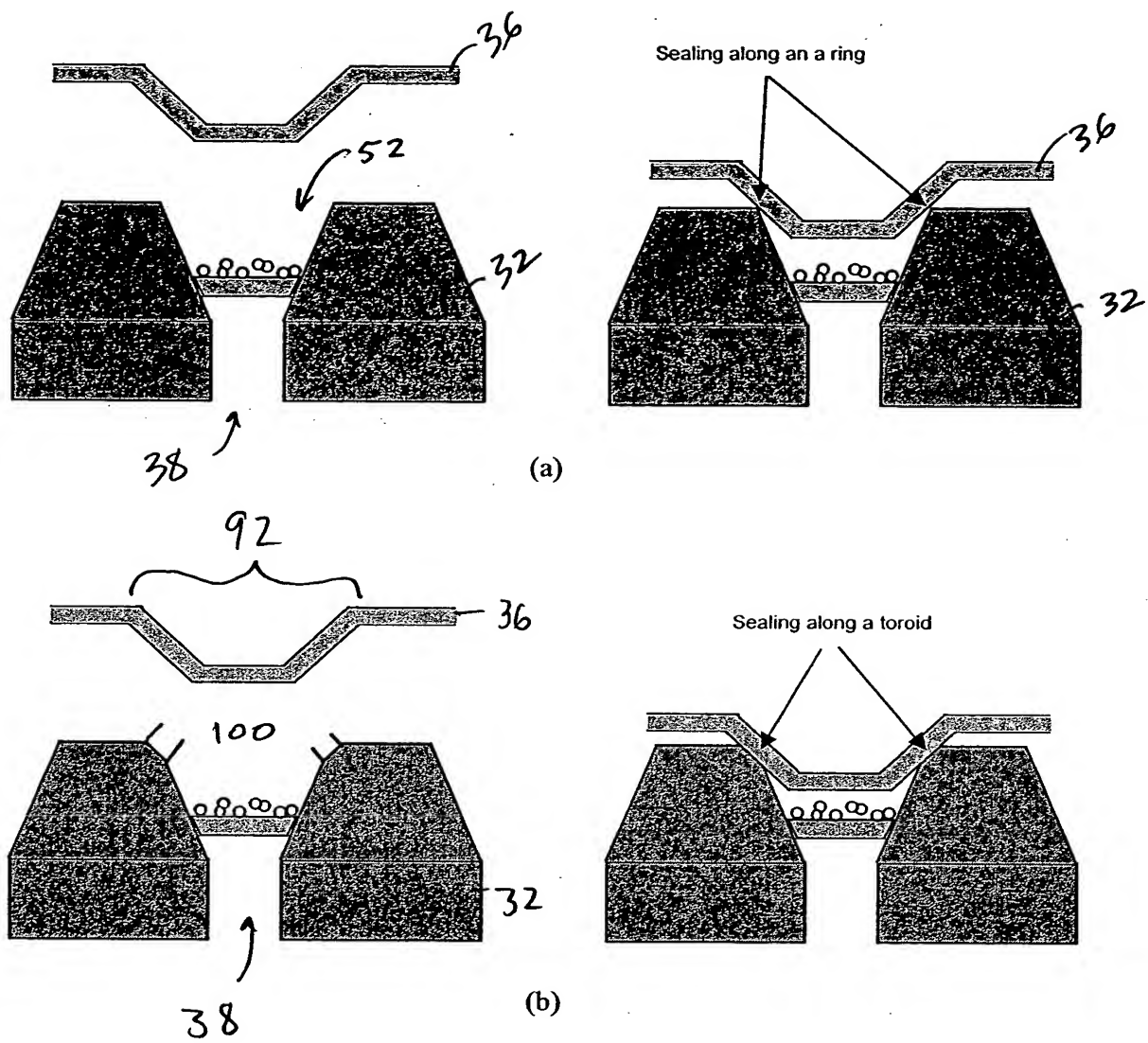
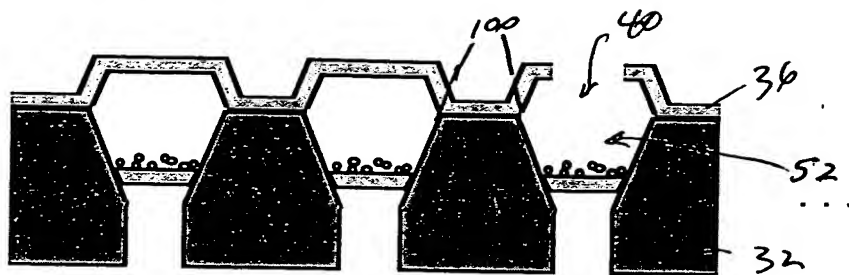
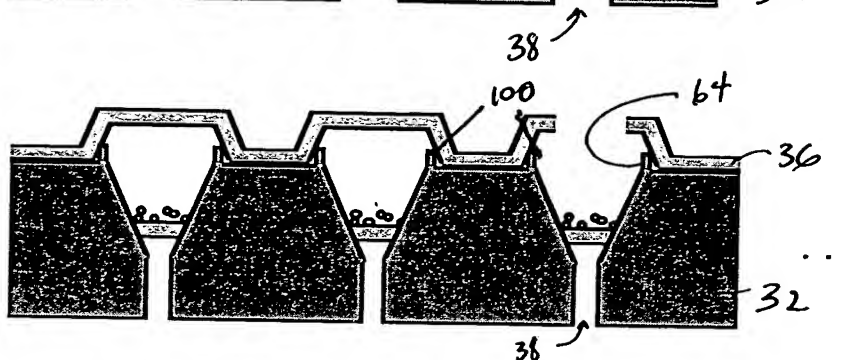


Figure 13

c



d



e

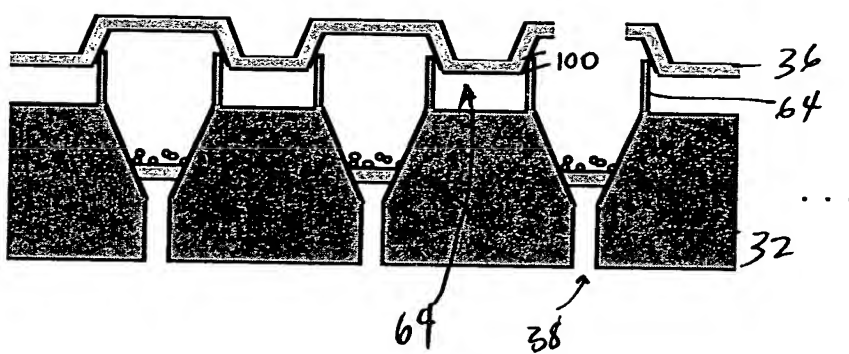


Figure 13 (cont.)

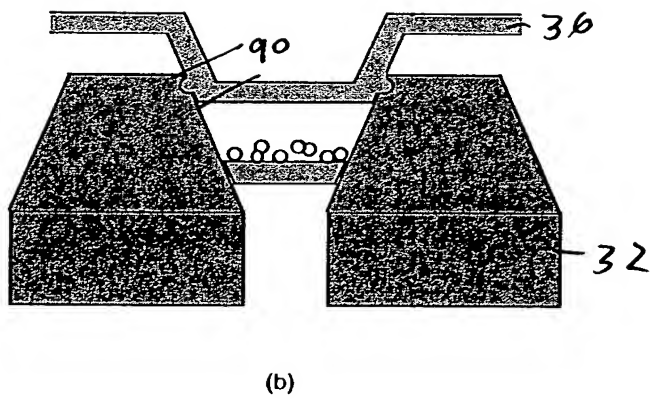
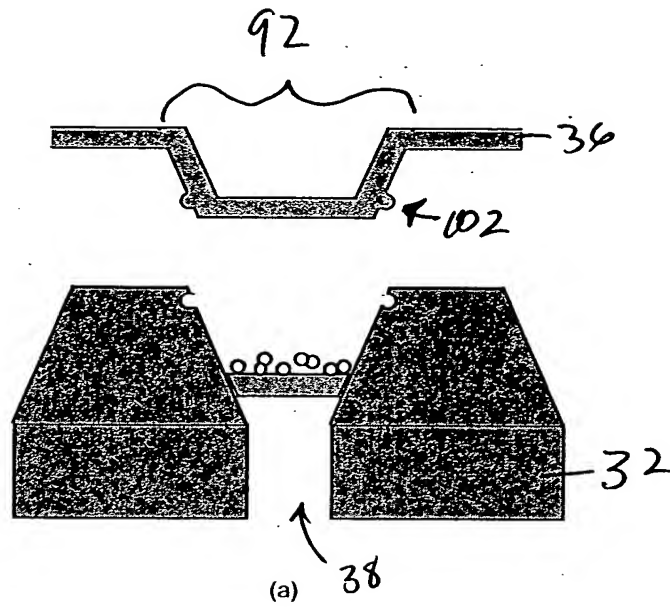


Figure 14

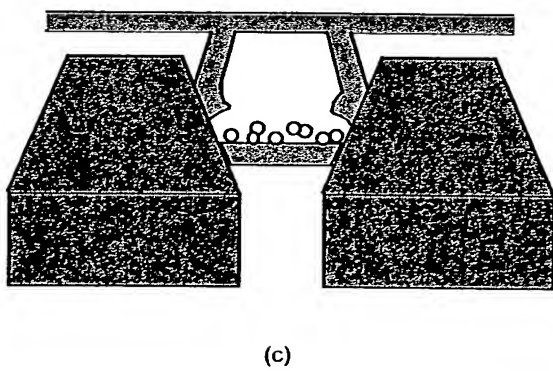
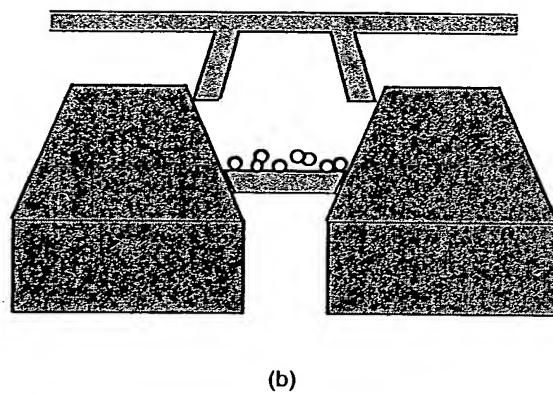
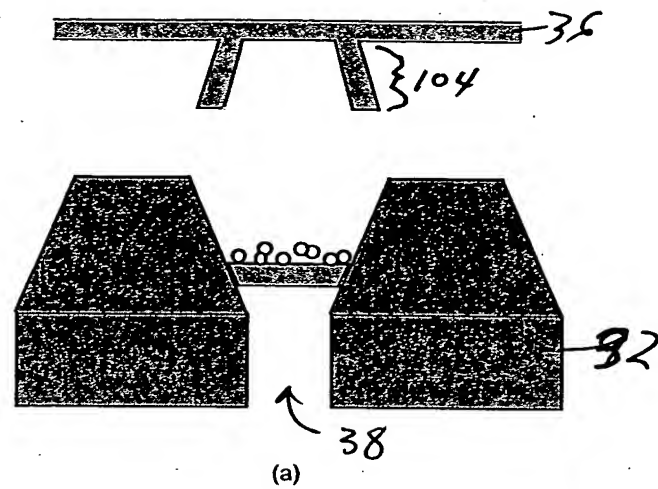


Figure 15

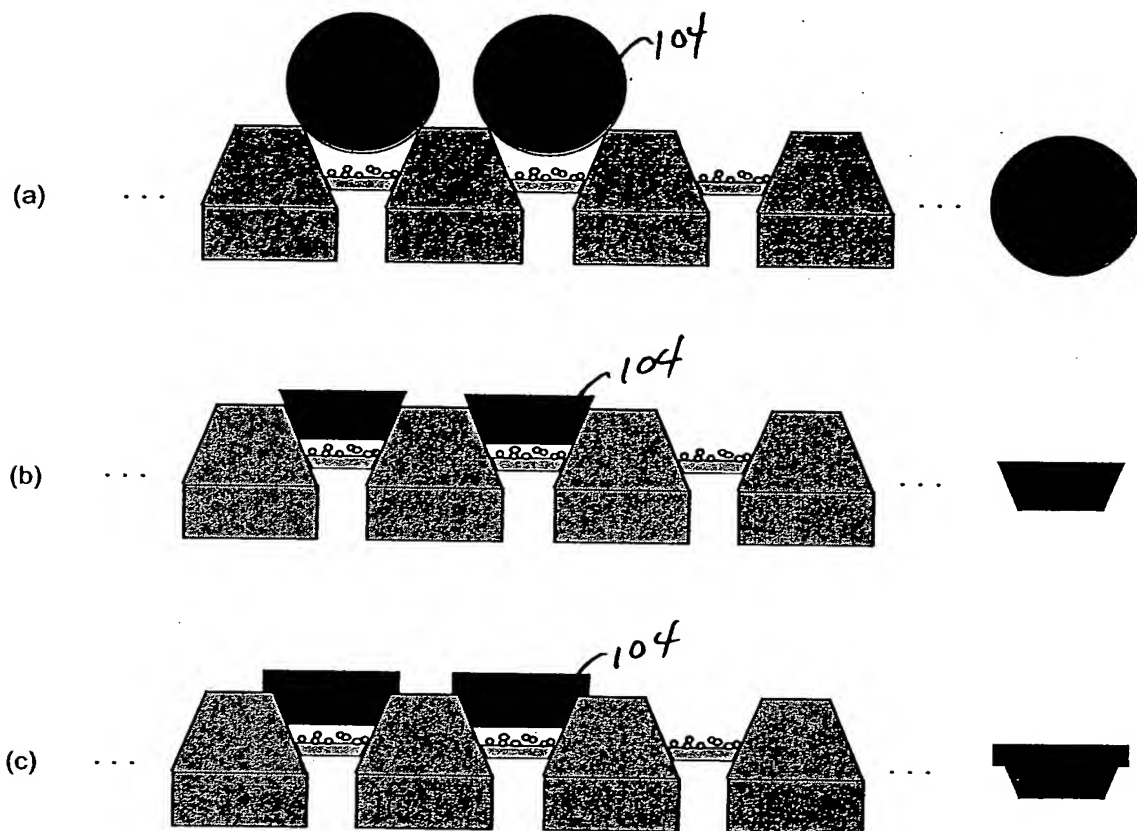


Figure 16

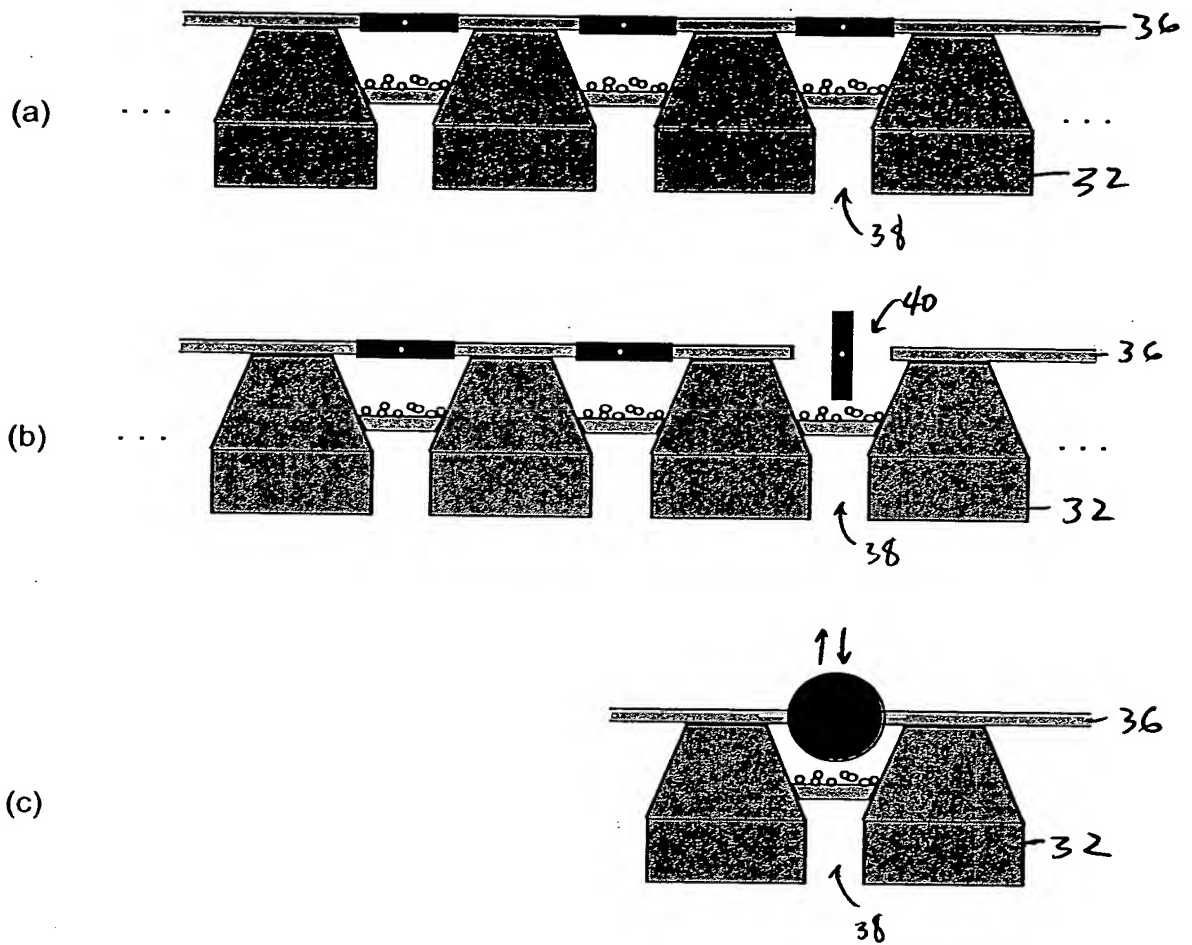


Figure 17

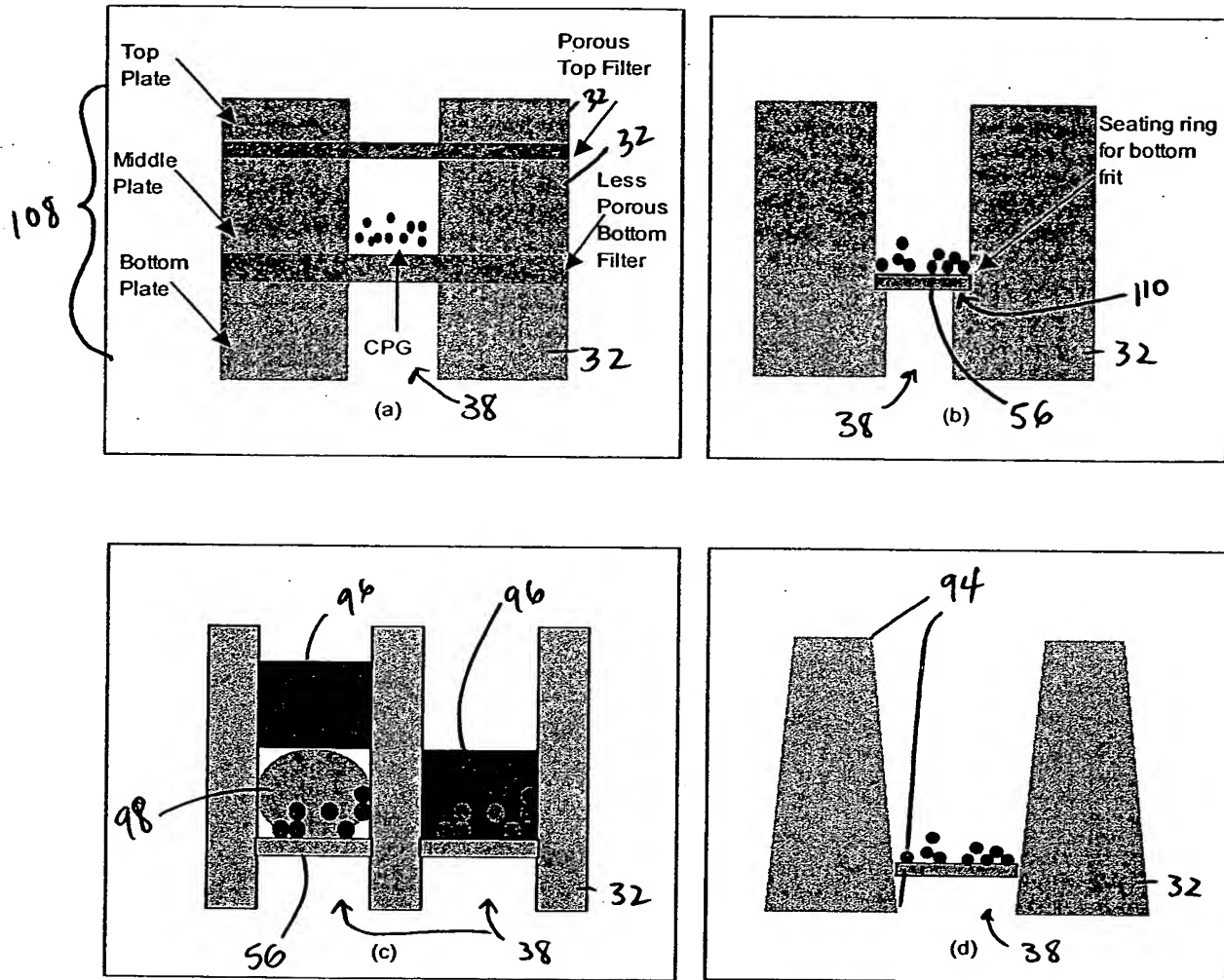


Figure 18

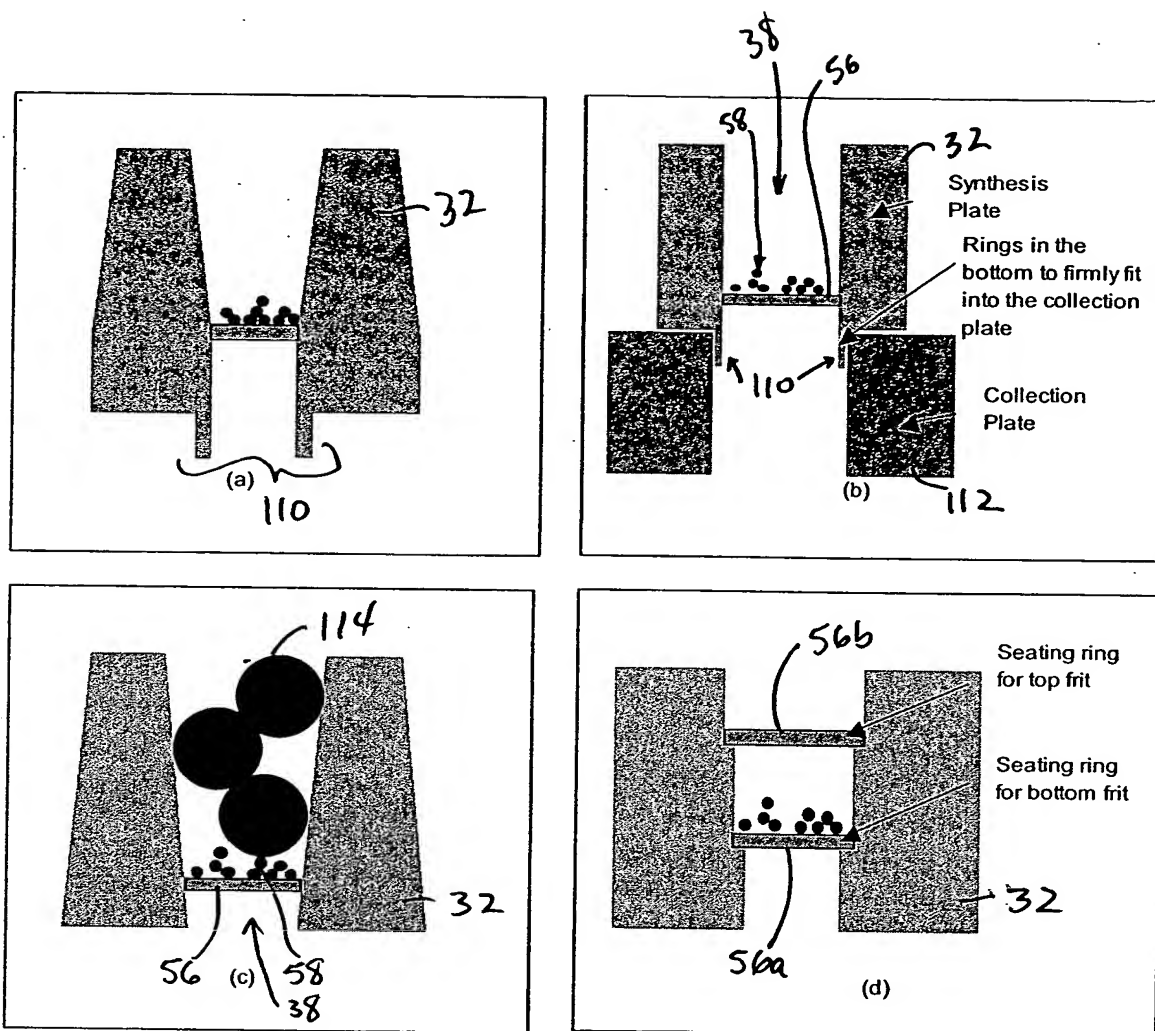


Figure 19

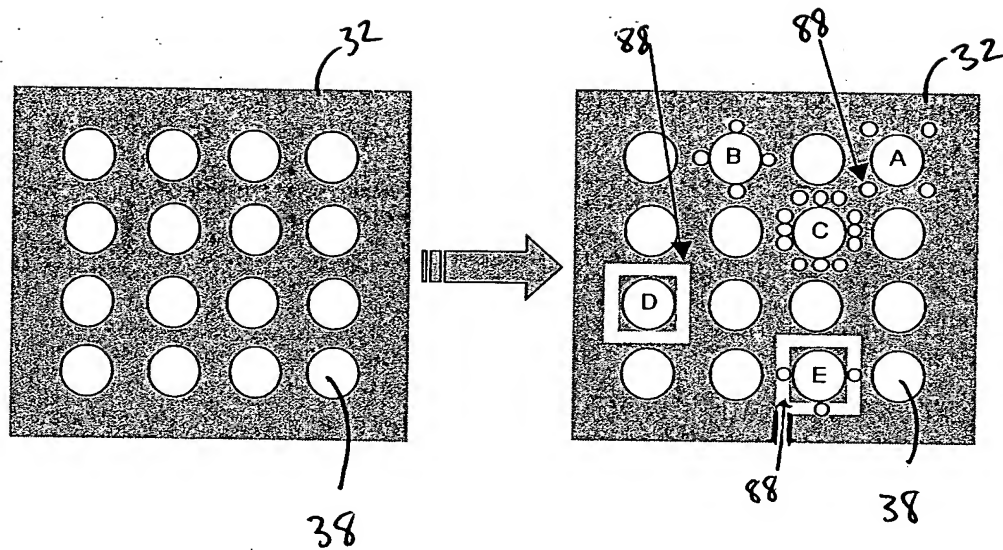


Figure 20

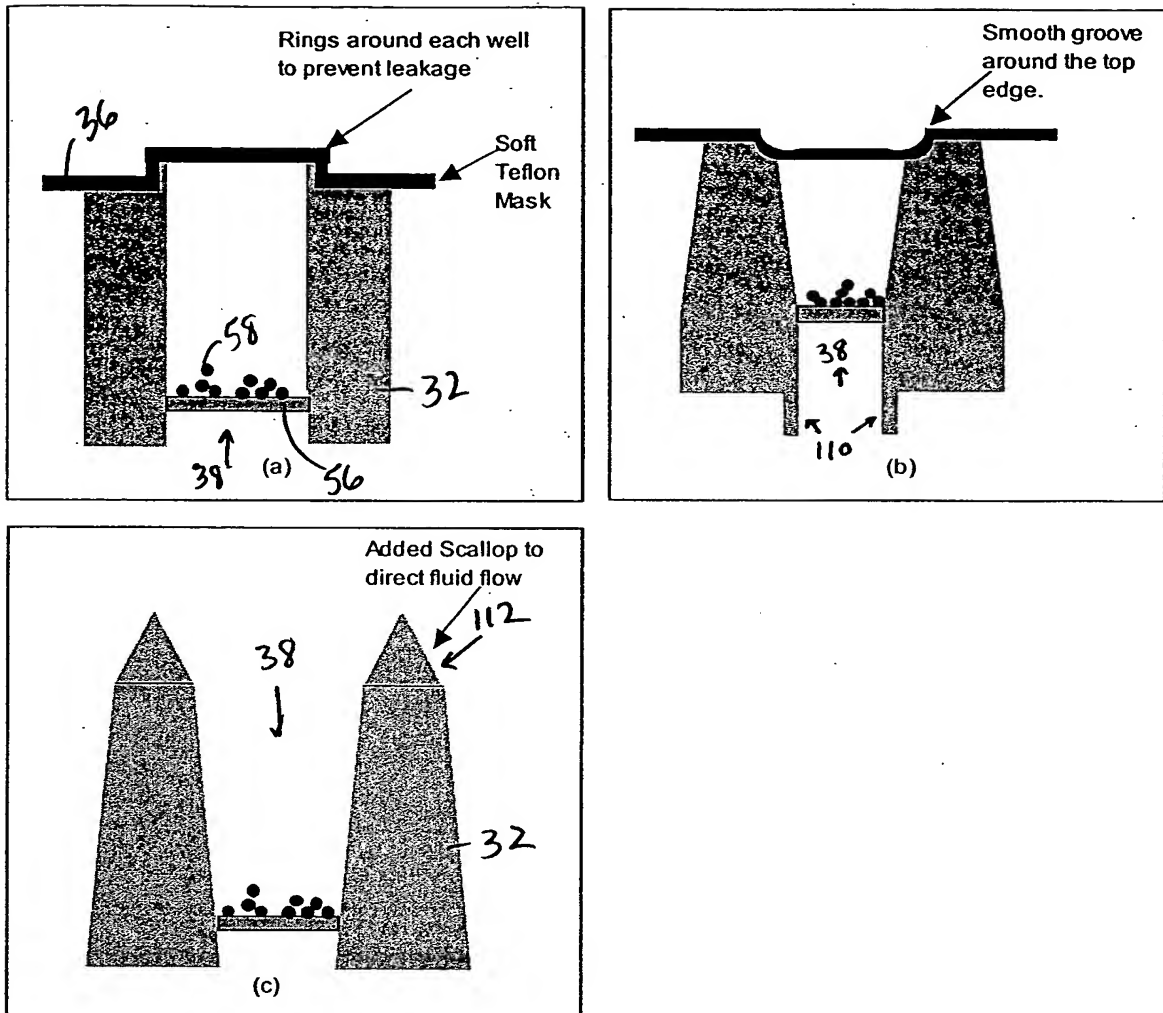


Figure 21

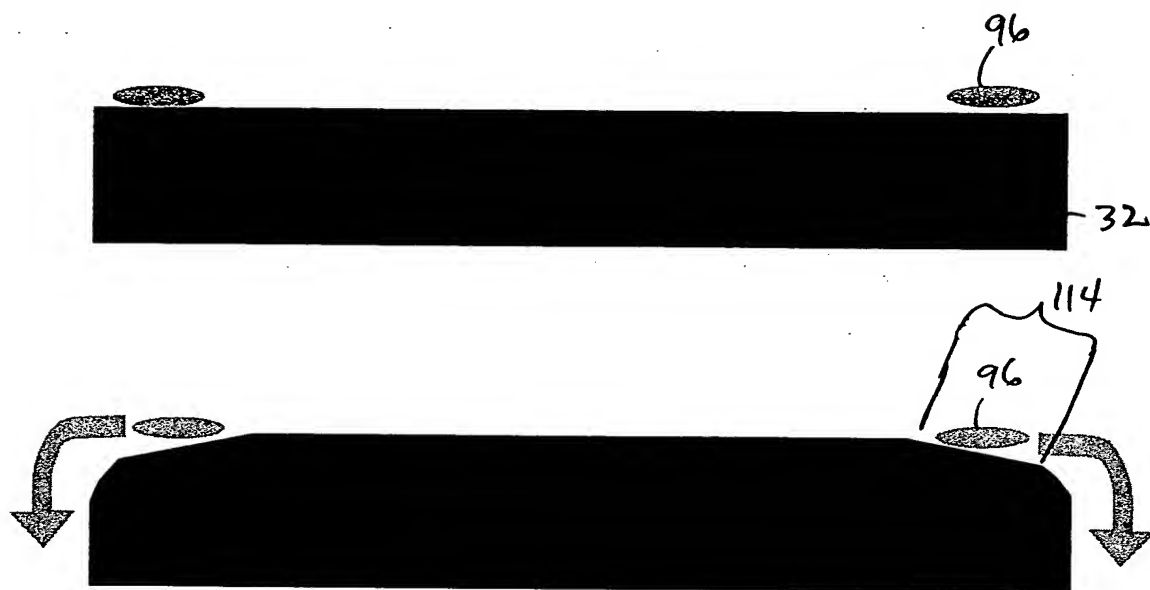


Figure 22

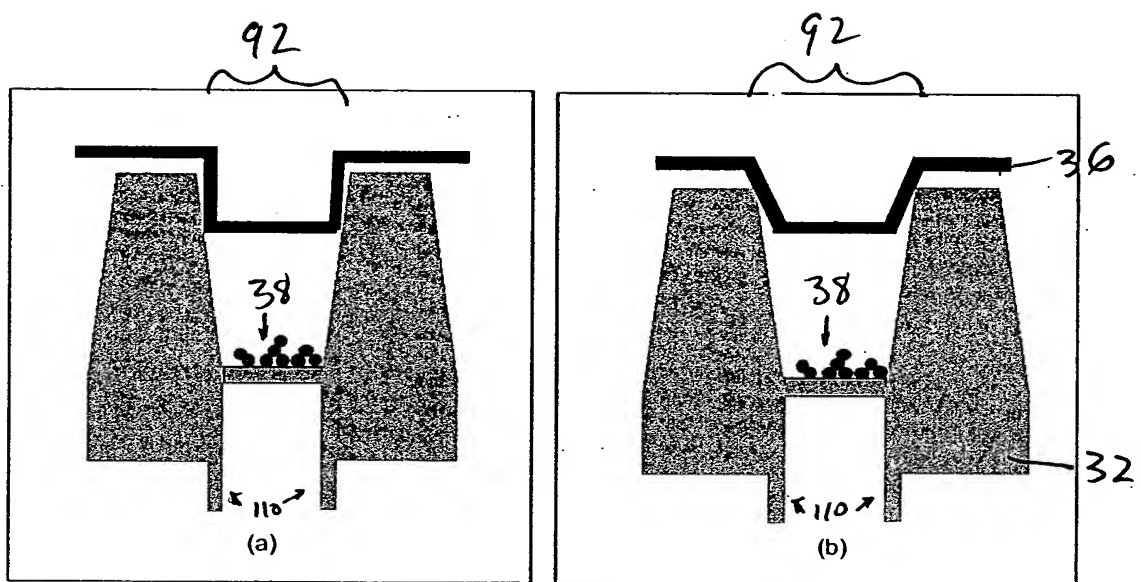


Figure 23

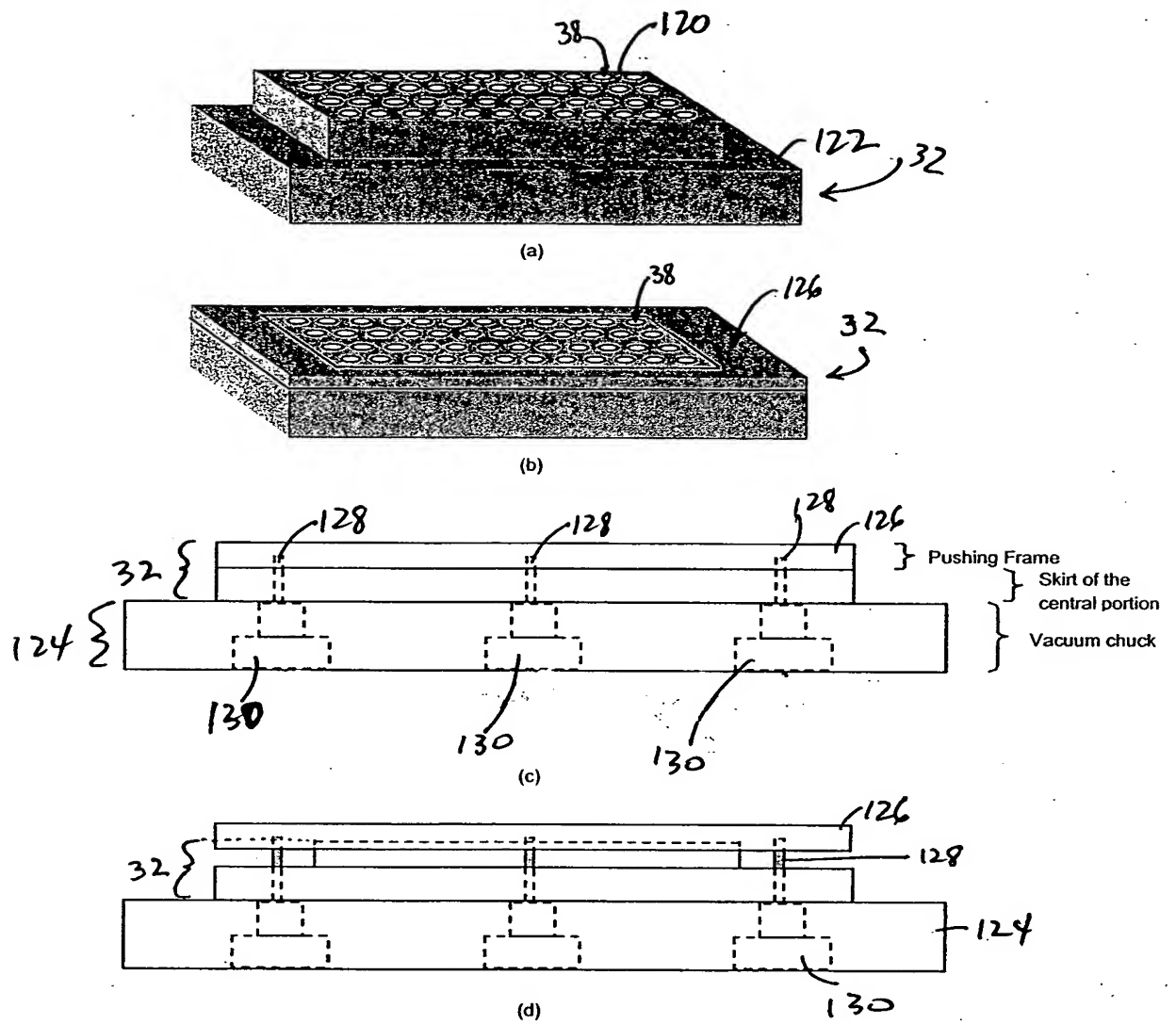


Figure 24

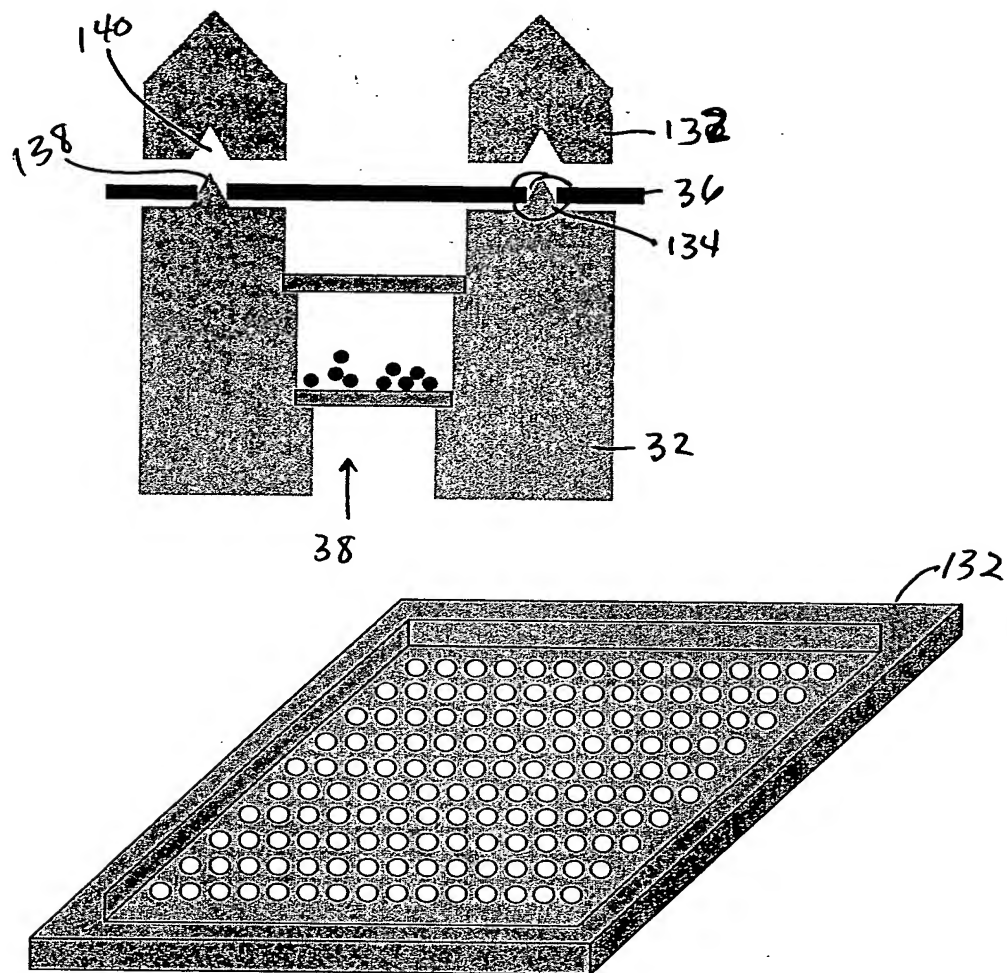


Figure 25

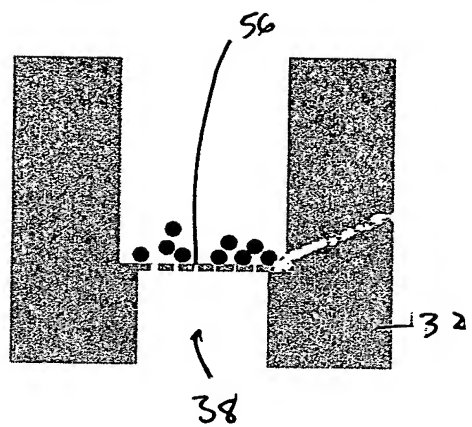


Figure 26

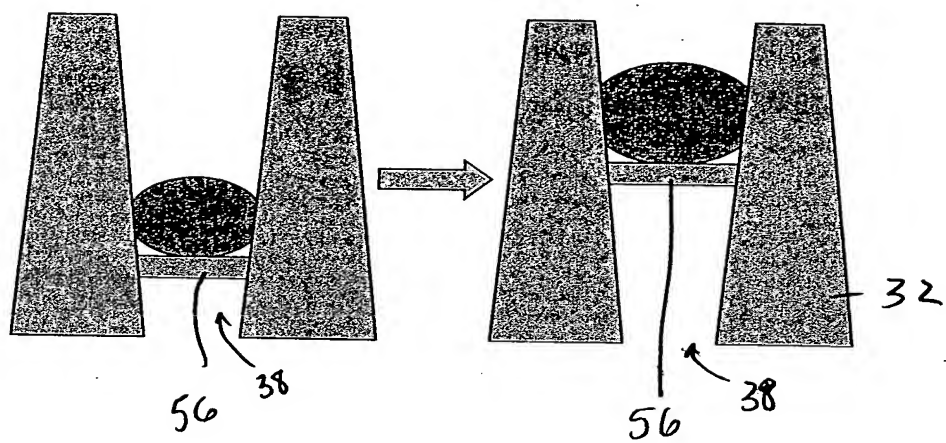


Figure 27

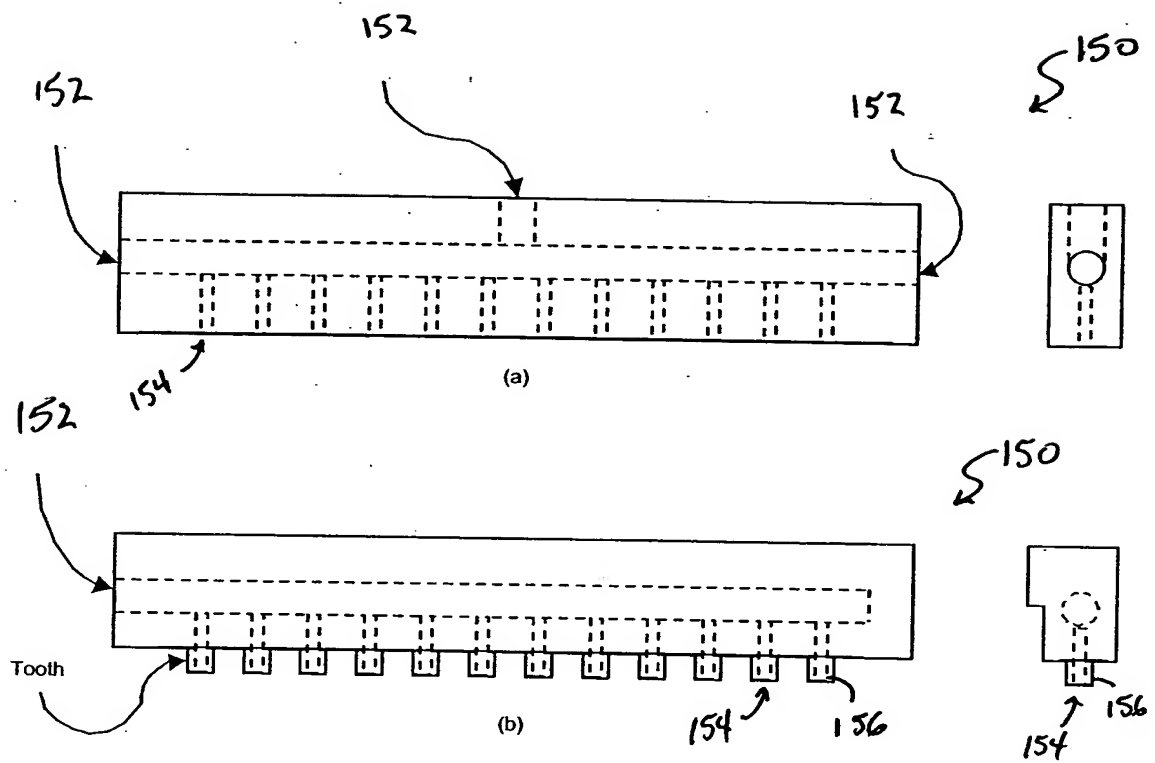
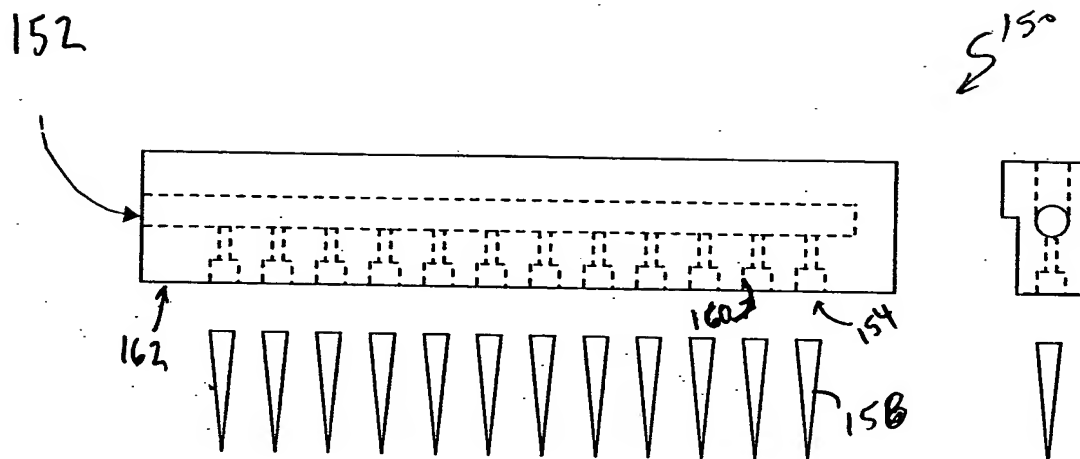
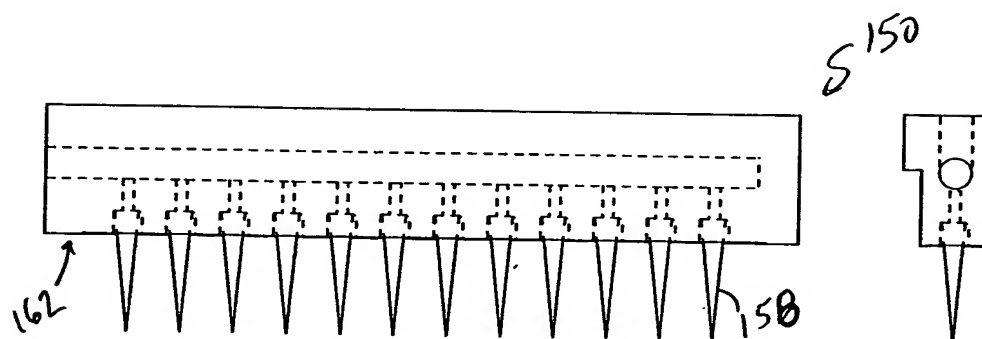


Figure 28



(a)



(b)

Figure 29

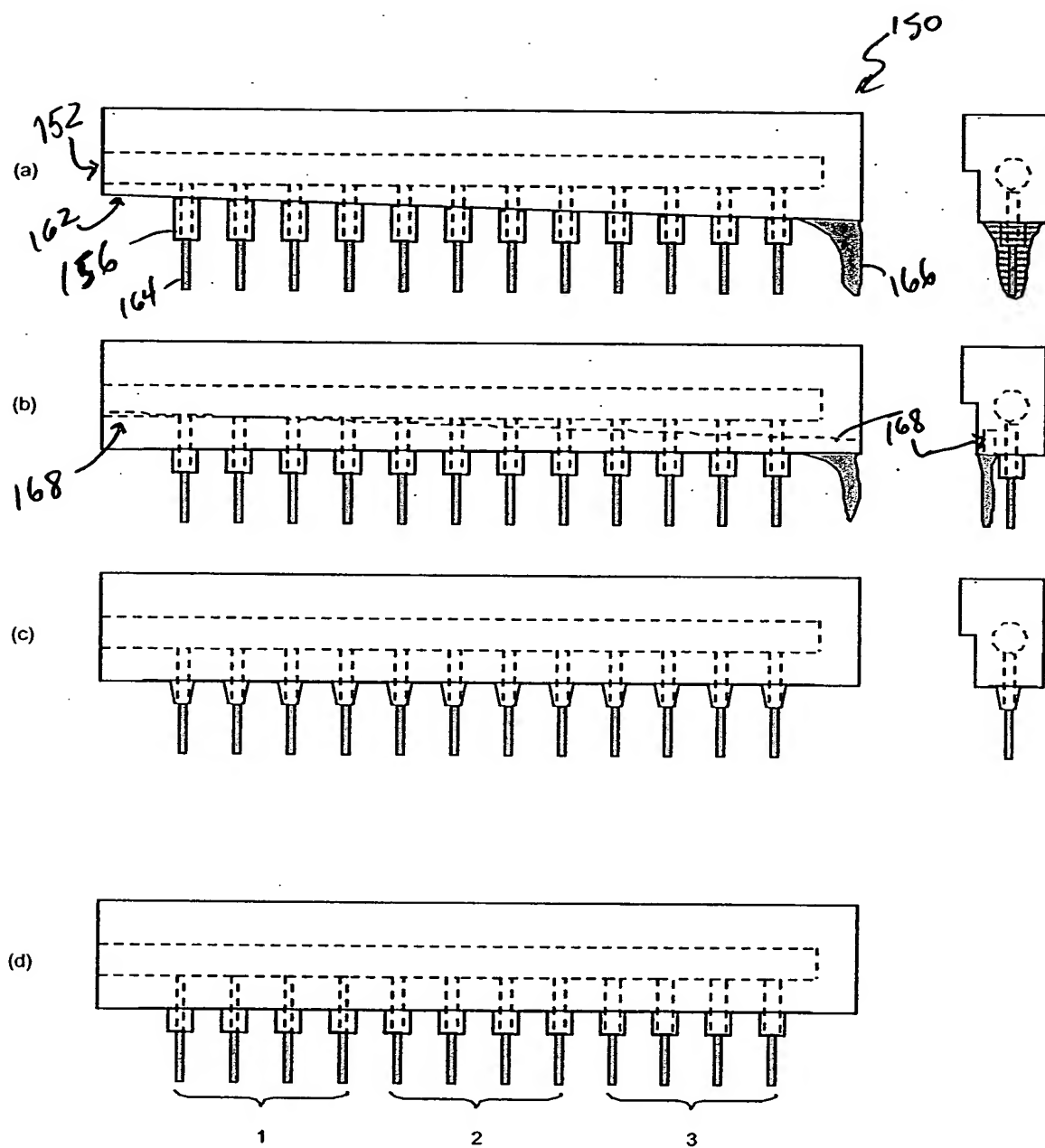


Figure 30

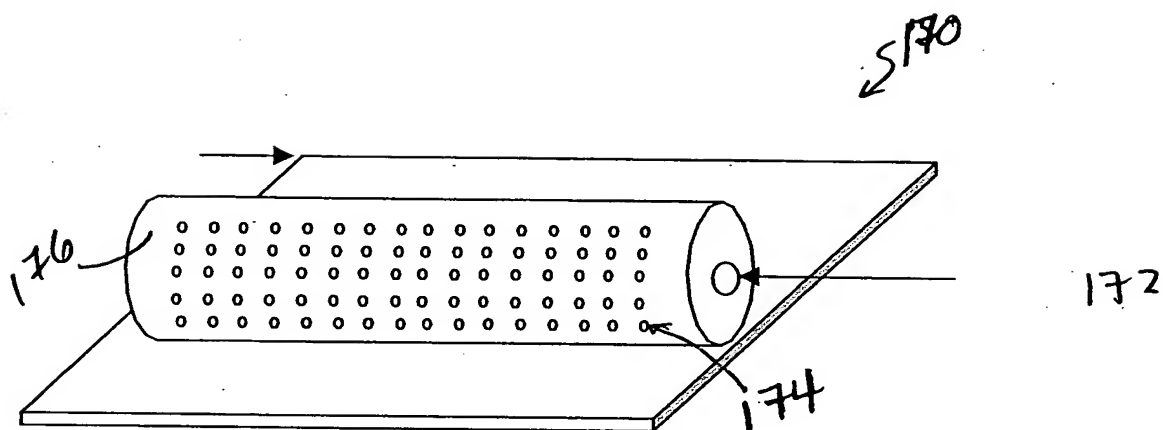


Figure 31

| Step | Wait Time (ms) | Prime? | Flush? | Vacuum |
|----------------------|----------------|--------|--------|------------|
| 0 DEBLOCK | 35000 | Yes | No | NOT_AT_ALL |
| 1 DEBLOCK | 35000 | No | No | NOT_AT_ALL |
| 2 DEBLOCK | 30000 | No | No | FOLLOWING |
| 3 DEBLOCK | 30000 | No | No | NOT_AT_ALL |
| 4 DEBLOCK | 30000 | No | No | NOT_AT_ALL |
| 5 DEBLOCK | 30000 | No | Yes | FOLLOWING |
| 6 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 7 ACETONITRILE_WASH | 20100 | No | No | FOLLOWING |
| 8 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 9 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 10 COUPLE | 35000 | Yes | No | NOT_AT_ALL |
| 11 COUPLE | 35000 | No | No | FOLLOWING |
| 12 COUPLE | 35000 | No | Yes | FOLLOWING |
| 13 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 14 ACETONITRILE_WASH | 20100 | No | No | FOLLOWING |
| 15 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 16 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 17 CAP | 30000 | Yes | No | NOT_AT_ALL |
| 18 CAP | 30000 | No | Yes | FOLLOWING |
| 19 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 20 ACETONITRILE_WASH | 20100 | No | No | FOLLOWING |
| 21 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 22 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 23 OXIDIZE | 30000 | Yes | No | NOT_AT_ALL |
| 24 OXIDIZE | 30000 | No | Yes | FOLLOWING |
| 25 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 26 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 27 ACETONITRILE_WASH | 20100 | No | No | FOLLOWING |
| 28 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 29 ACETONITRILE_WASH | 5100 | No | No | FOLLOWING |
| 30 ACETONITRILE_WASH | 5100 | No | No | DURING |
| 31 ACETONITRILE_WASH | 100 | No | No | DURING |
| 32 ACETONITRILE_WASH | 100 | No | No | DURING |

Figure 32

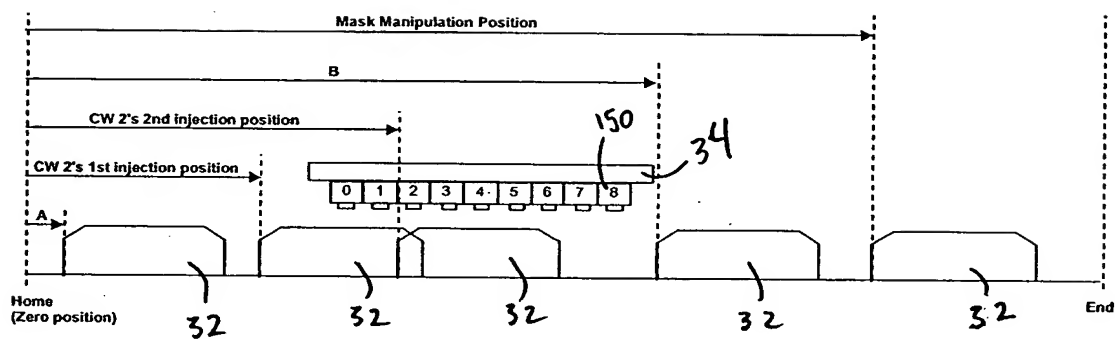


Figure 33

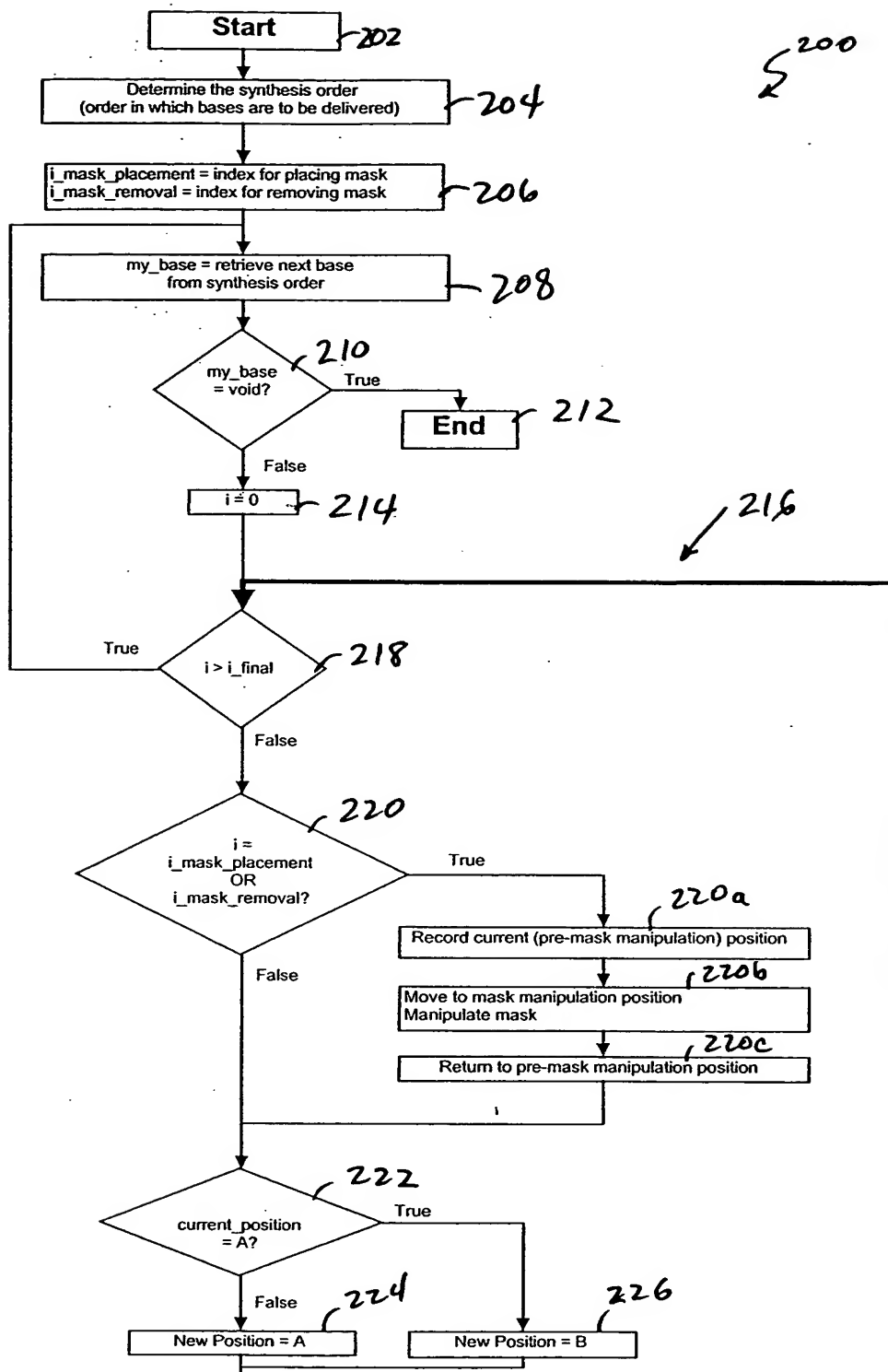


Figure 34

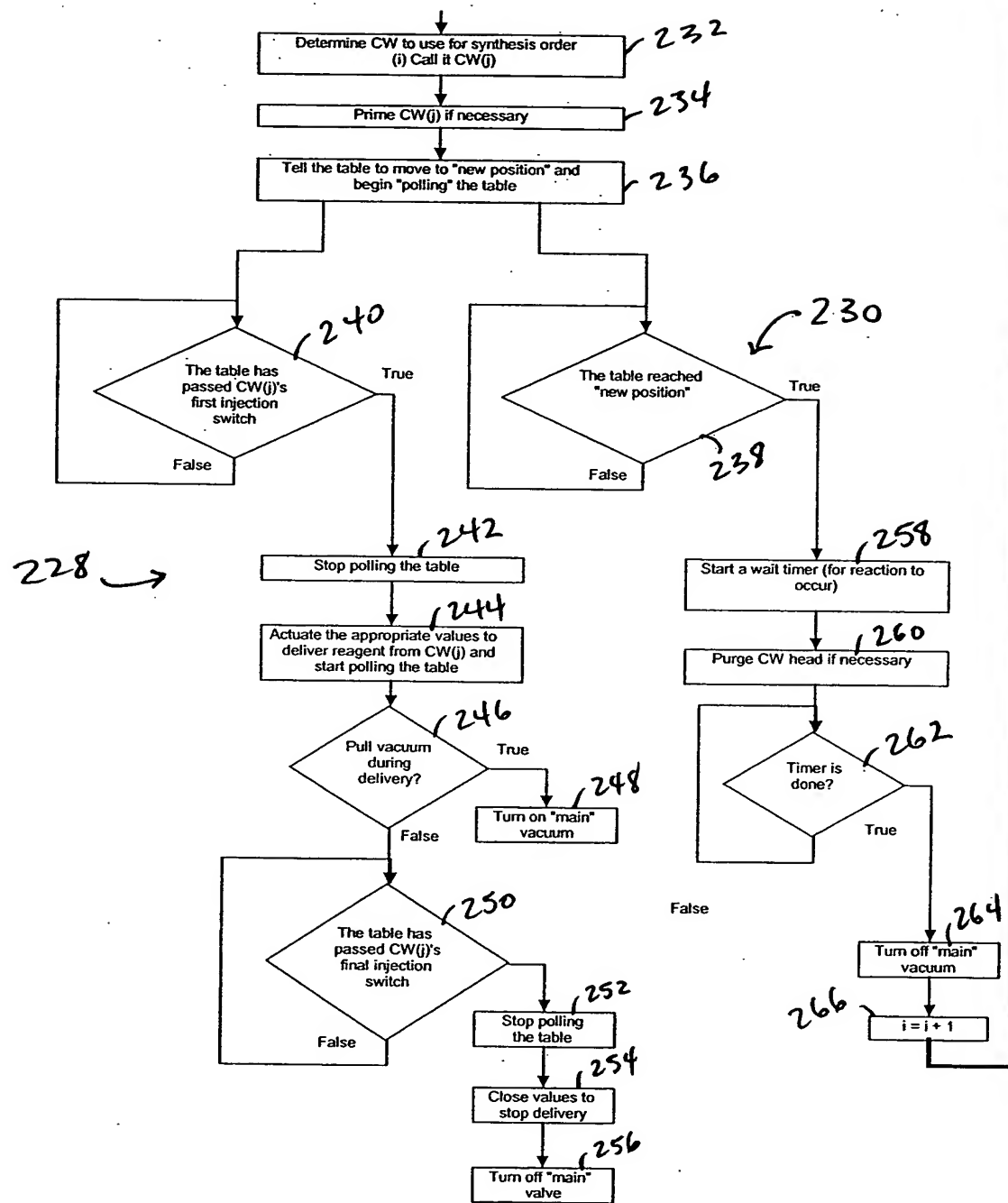


Figure 35

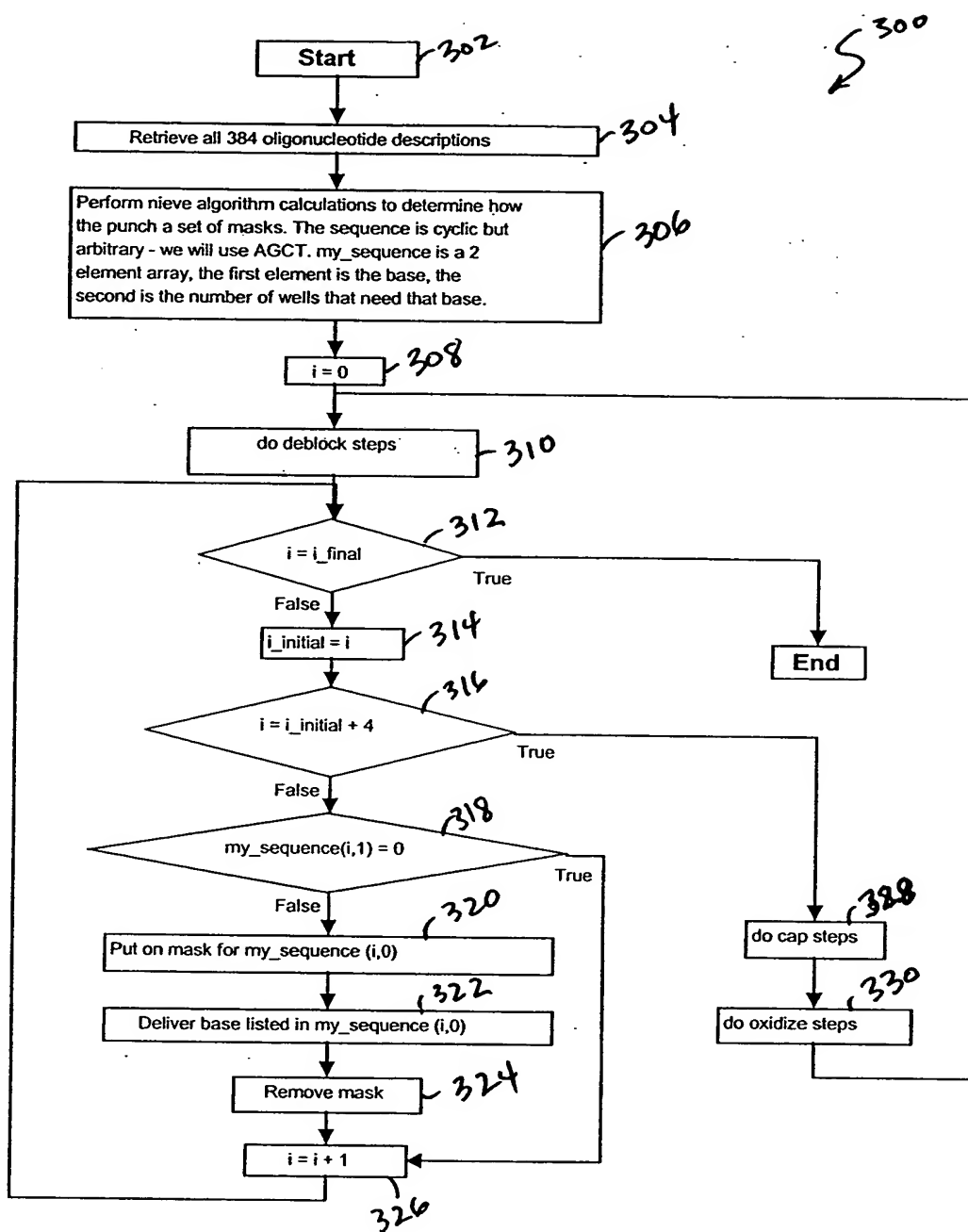


Figure 36

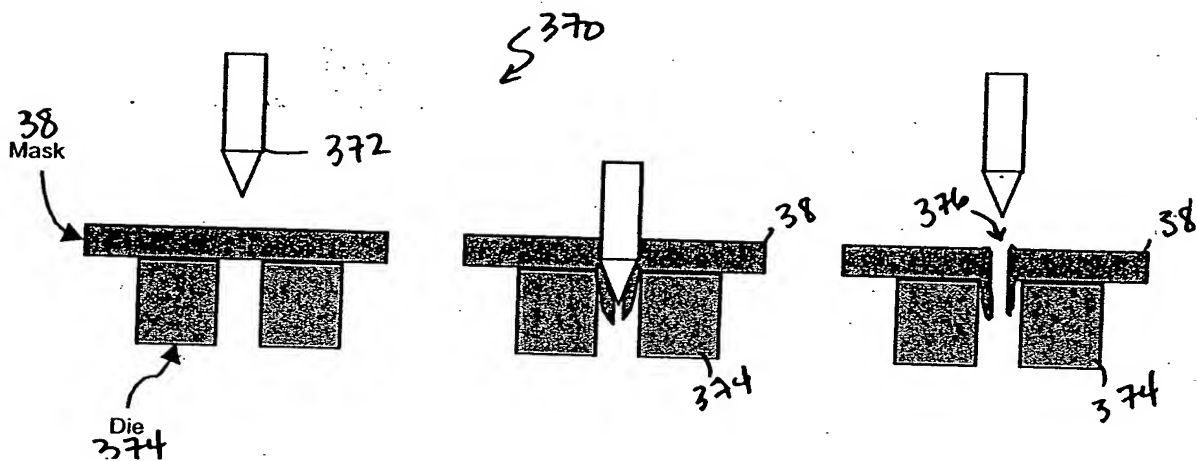


Figure 37

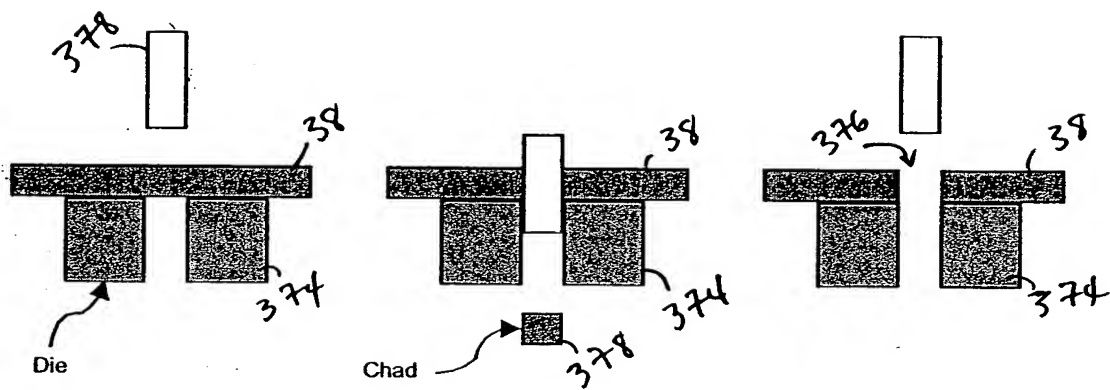
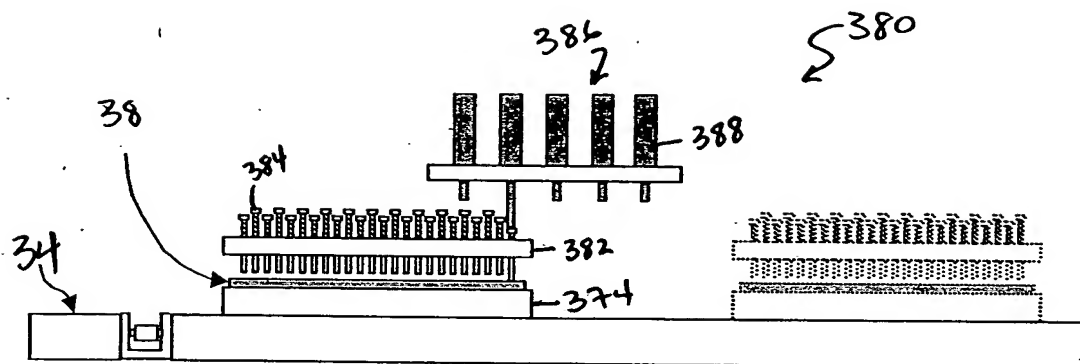
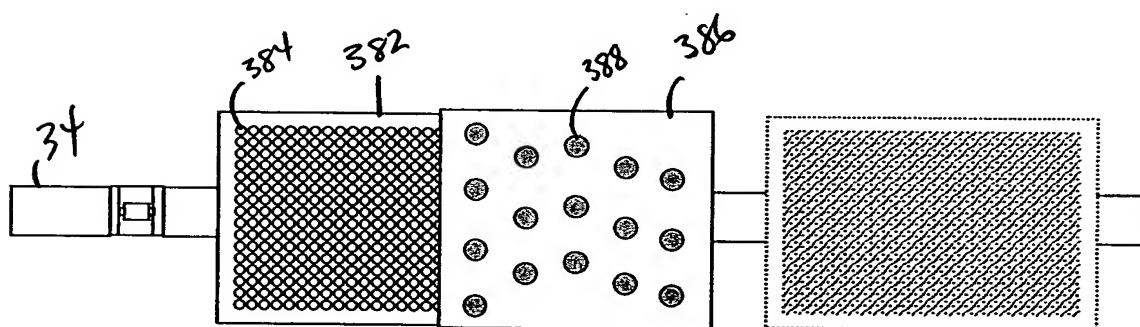


Figure 38



(a)



(b)

Figure 39

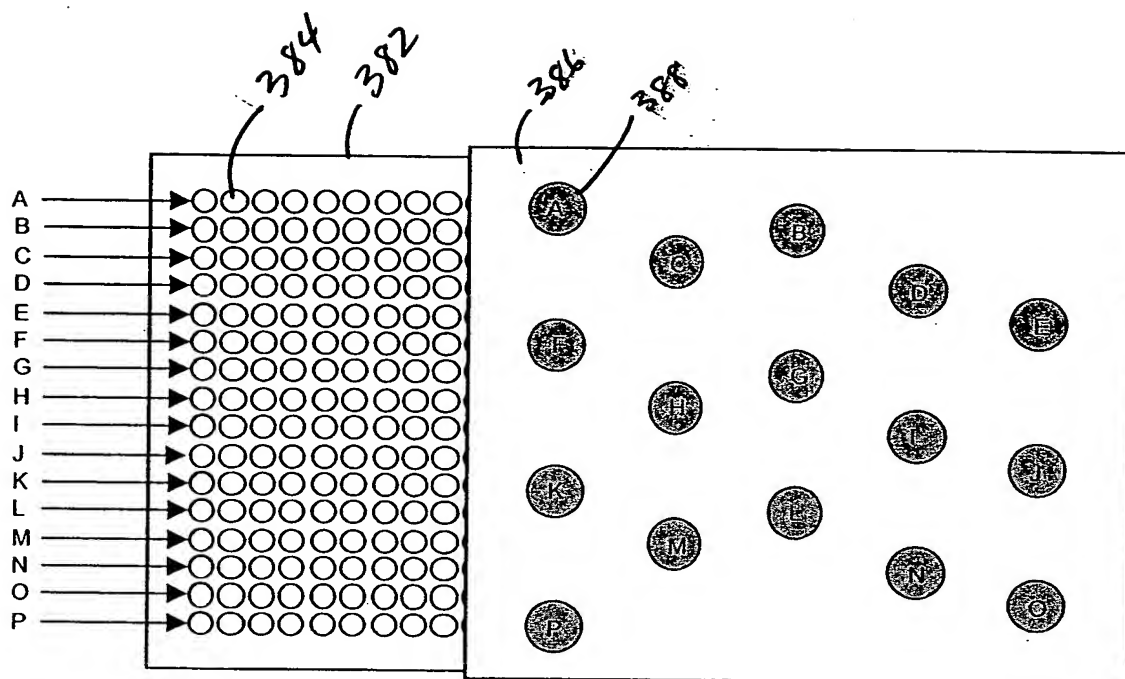


Figure 40

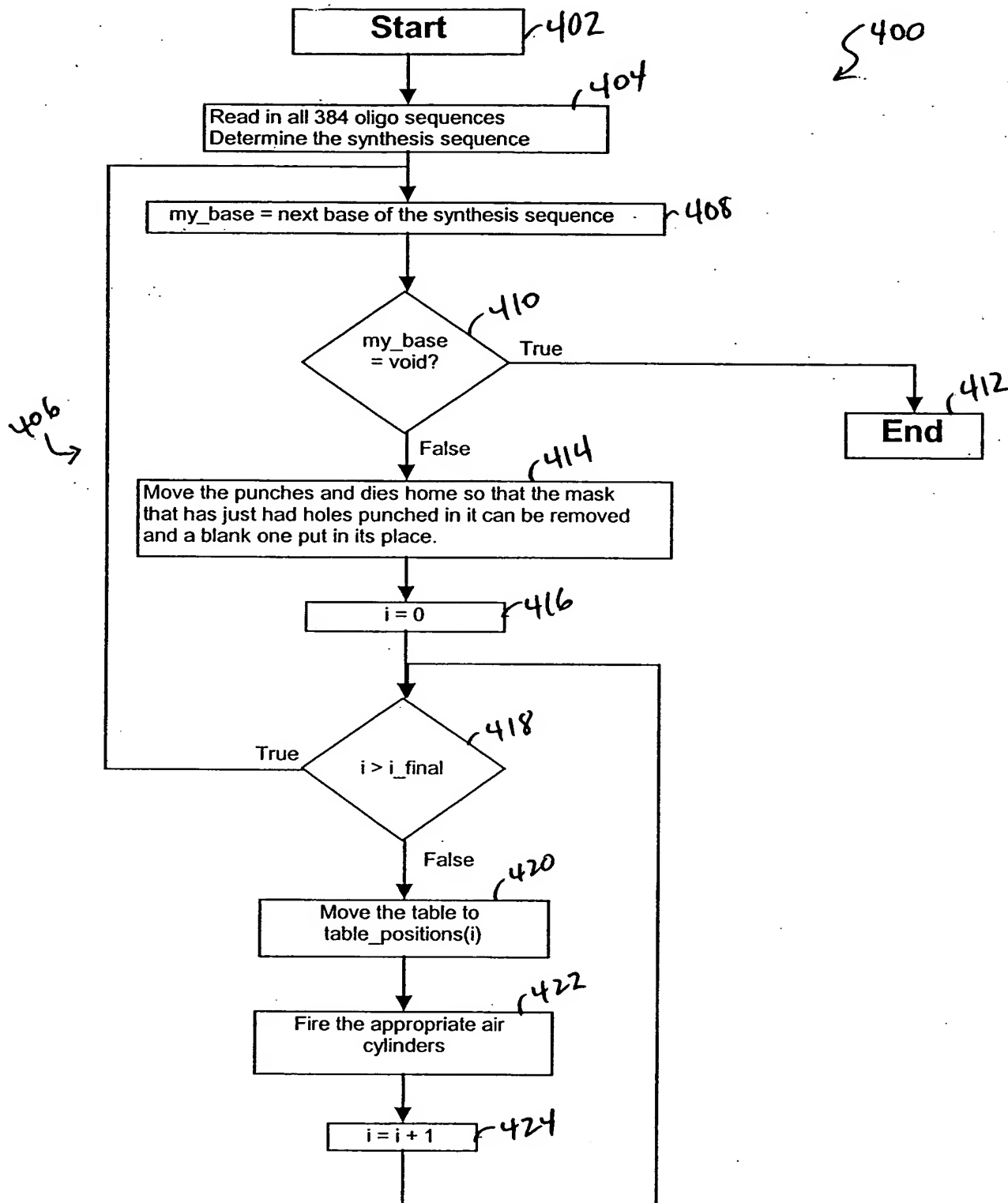


Figure 41

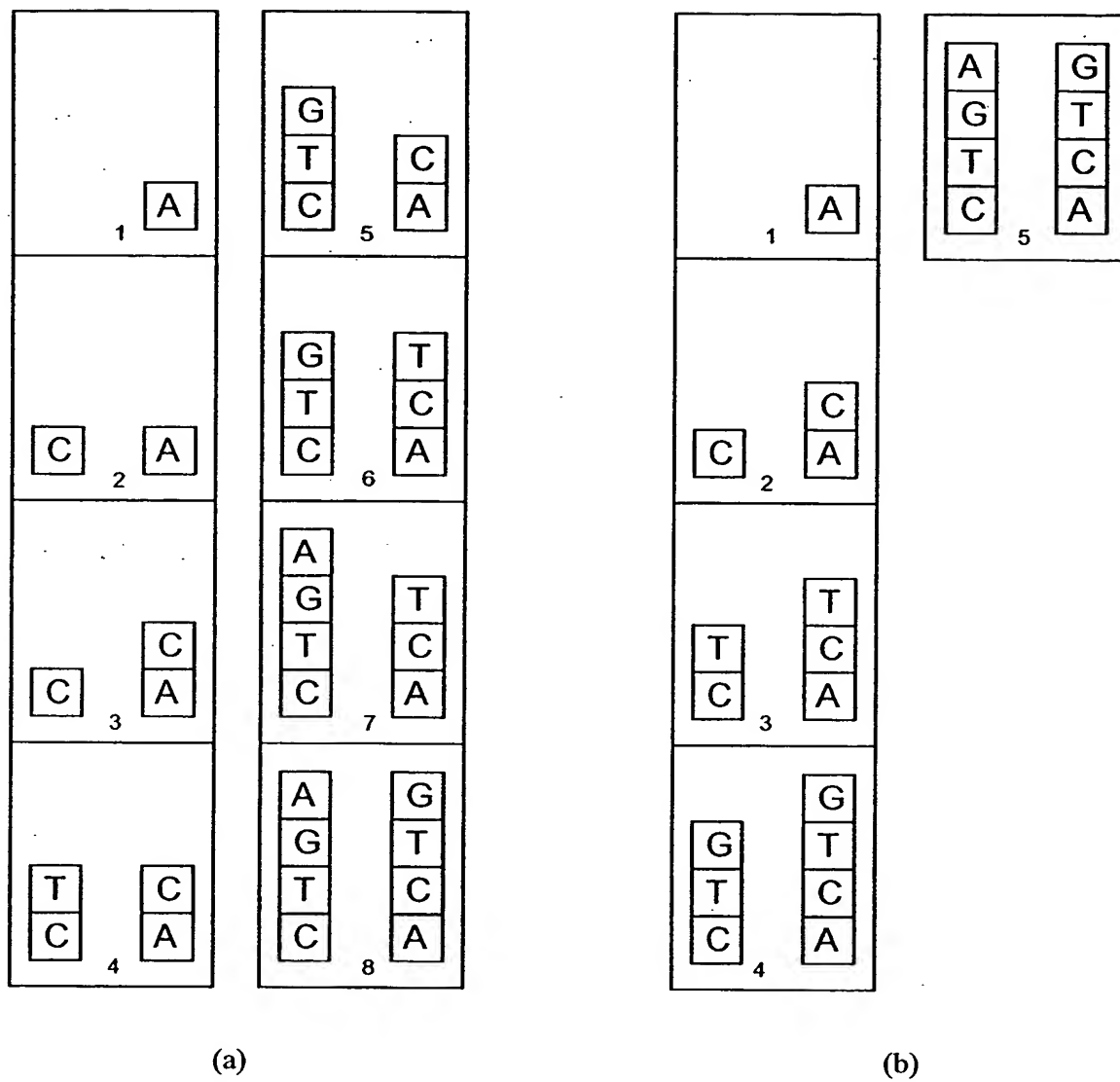


Figure 42

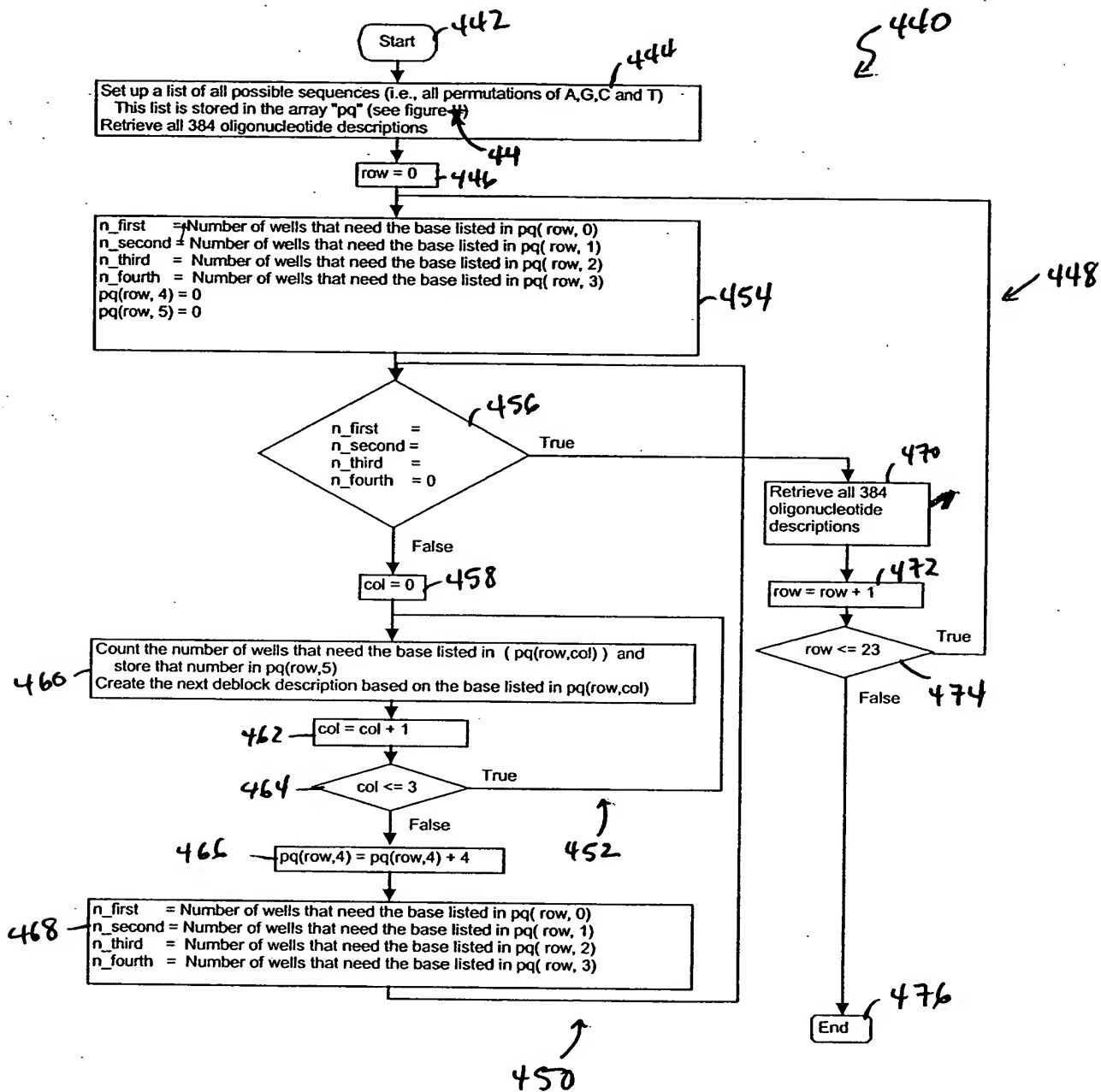


Figure 43

| | col ↓ | | | | | |
|----|----------|---|---|---|----|------|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| 0 | A | G | C | T | 60 | 7680 |
| 1 | A | G | T | C | 72 | 7680 |
| 2 | A | C | G | T | 64 | 7680 |
| 3 | A | C | T | G | 64 | 7680 |
| 4 | A | T | G | C | 68 | 7680 |
| 5 | A | T | C | G | 60 | 7680 |
| 6 | G | A | C | T | 56 | 7680 |
| 7 | G | A | T | C | 60 | 7680 |
| 8 | G | C | A | T | 0 | 0 |
| 9 | G | C | T | A | 0 | 0 |
| 10 | G | T | A | C | 0 | 0 |
| 11 | G | T | C | A | 0 | 0 |
| 12 | C | A | G | T | 0 | 0 |
| 13 | C | A | T | G | 0 | 0 |
| 14 | C | G | A | T | 0 | 0 |
| 15 | C | G | T | A | 0 | 0 |
| 16 | C | T | A | G | 0 | 0 |
| 17 | C | T | G | A | 0 | 0 |
| 18 | T | A | G | C | 0 | 0 |
| 19 | T | A | C | G | 0 | 0 |
| 20 | T | G | A | C | 0 | 0 |
| 21 | T | G | C | A | 0 | 0 |
| 22 | T | C | A | G | 0 | 0 |
| 23 | T | C | G | A | 0 | 0 |

All 24 permutations of the bases A, G, C and T

Number of cycles (evenly divisible by 4) through a given permutation required to synthesize all the oligonucleotides.

Total number of bases deprotected using a given permutation. This number must be the same for all permutations as they are all intended to be used to synthesize the same set of oligonucleotides. (It is only here for testing).

Figure 44

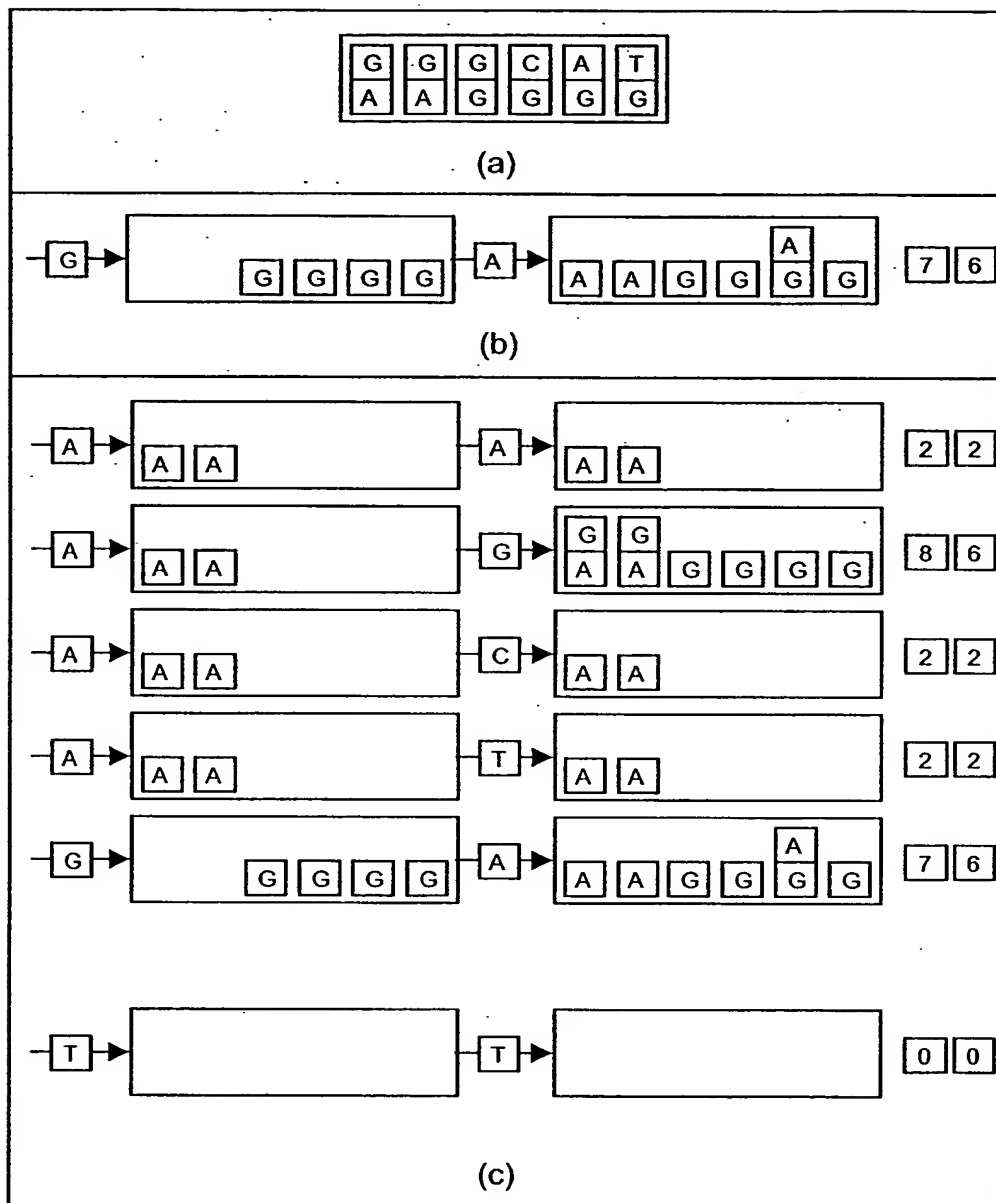


Figure 45

| <u>Sequence</u> | | <u># of coupling reactions</u> | | | <u># of oligos coupled</u> | | |
|-----------------|-------------|--------------------------------|-------------|-------|----------------------------|-----------------------|-------|
| First Base | Second Base | First Base | Second Base | Total | First pass | Unique on second pass | Total |
| G | A | 4 | 3 | 7 | 4 | 2 | 6 |

(a)

| <u>Permutations</u> | | <u># of coupling reactions</u> | | | <u># of oligos coupled</u> | | |
|---------------------|-------------|--------------------------------|-------------|-------|----------------------------|-----------------------|-------|
| First Base | Second Base | First Base | Second Base | Total | First pass | Unique on second pass | Total |
| A | A | 2 | 0 | 2 | 2 | 0 | 2 |
| A | G | 2 | 6 | 8 | 2 | 4 | 6 |
| A | C | 2 | 0 | 2 | 2 | 0 | 2 |
| A | T | 2 | 0 | 2 | 2 | 0 | 2 |
| G | A | 4 | 3 | 7 | 4 | 2 | 6 |
| G | G | 4 | 1 | 5 | 4 | 0 | 4 |
| G | C | 4 | 1 | 5 | 4 | 0 | 4 |
| G | T | 4 | 1 | 5 | 4 | 0 | 4 |
| C | A | 0 | 2 | 2 | 0 | 2 | 2 |
| C | G | 0 | 4 | 4 | 0 | 4 | 4 |
| C | C | 0 | 0 | 0 | 0 | 0 | 0 |
| C | T | 0 | 0 | 0 | 0 | 0 | 0 |
| T | A | 0 | 2 | 2 | 0 | 2 | 2 |
| T | G | 0 | 4 | 4 | 0 | 4 | 4 |
| T | C | 0 | 0 | 0 | 0 | 0 | 0 |
| T | T | 0 | 0 | 0 | 0 | 0 | 0 |

(b)

Figure 46

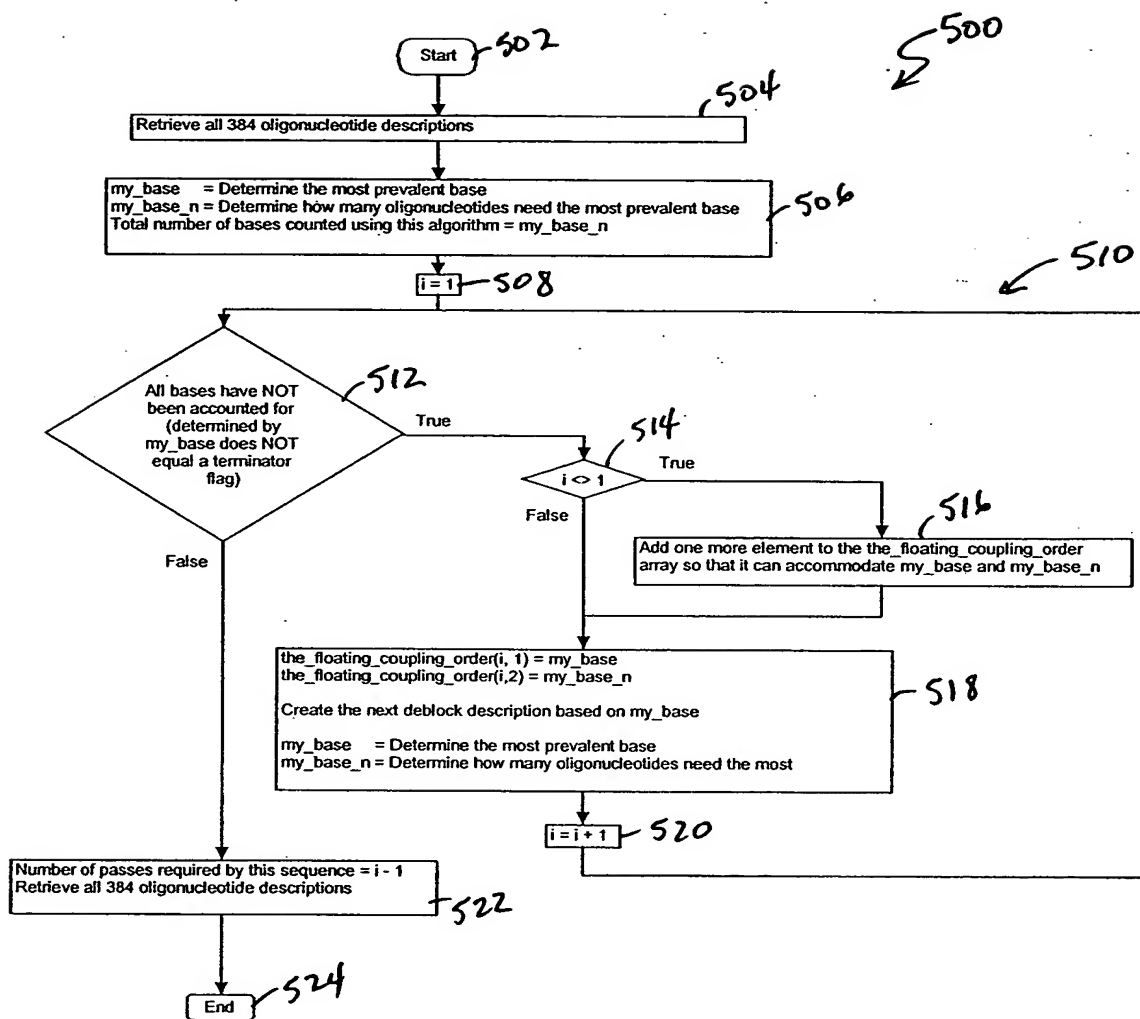


Figure 47

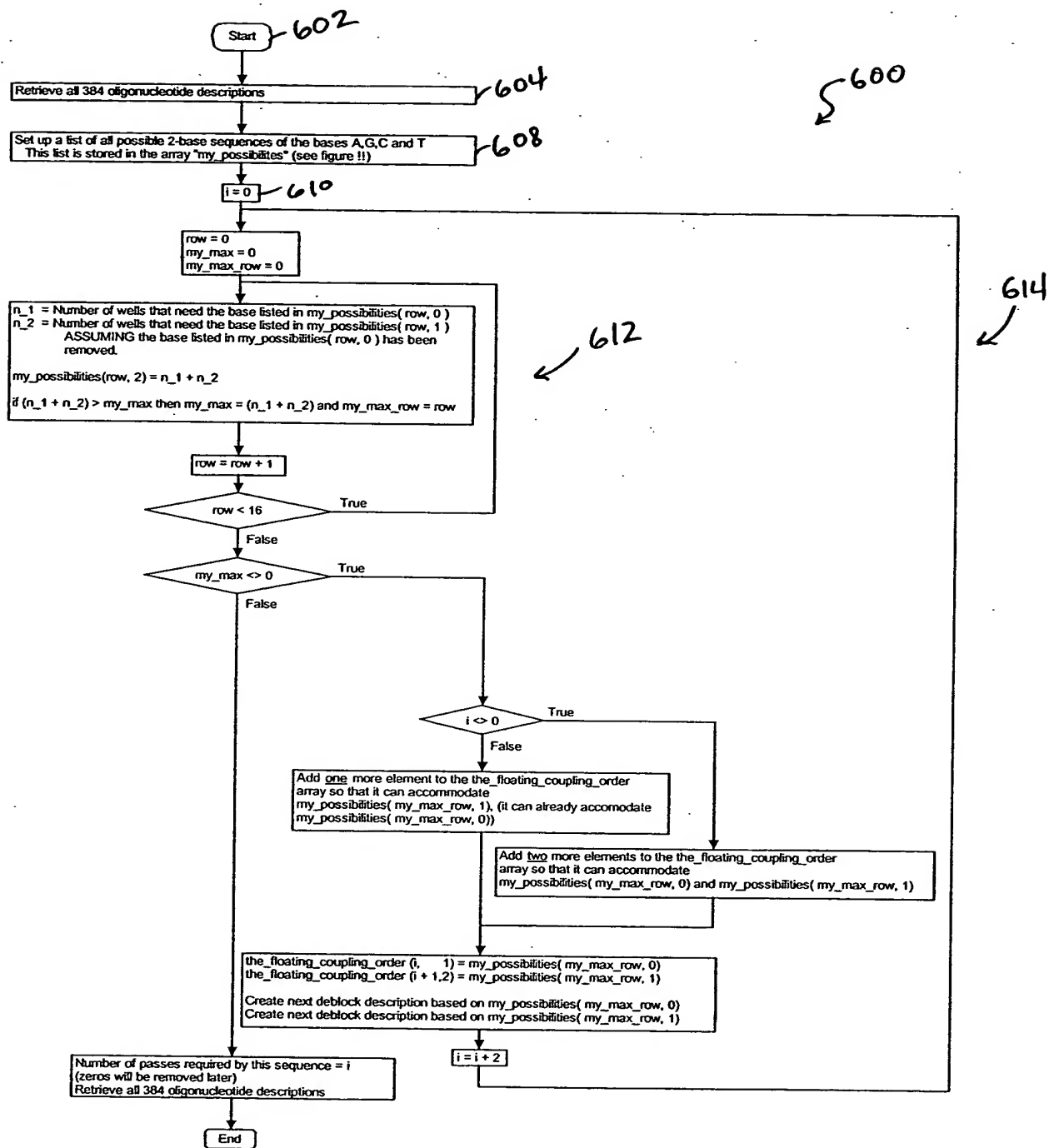


Figure 48

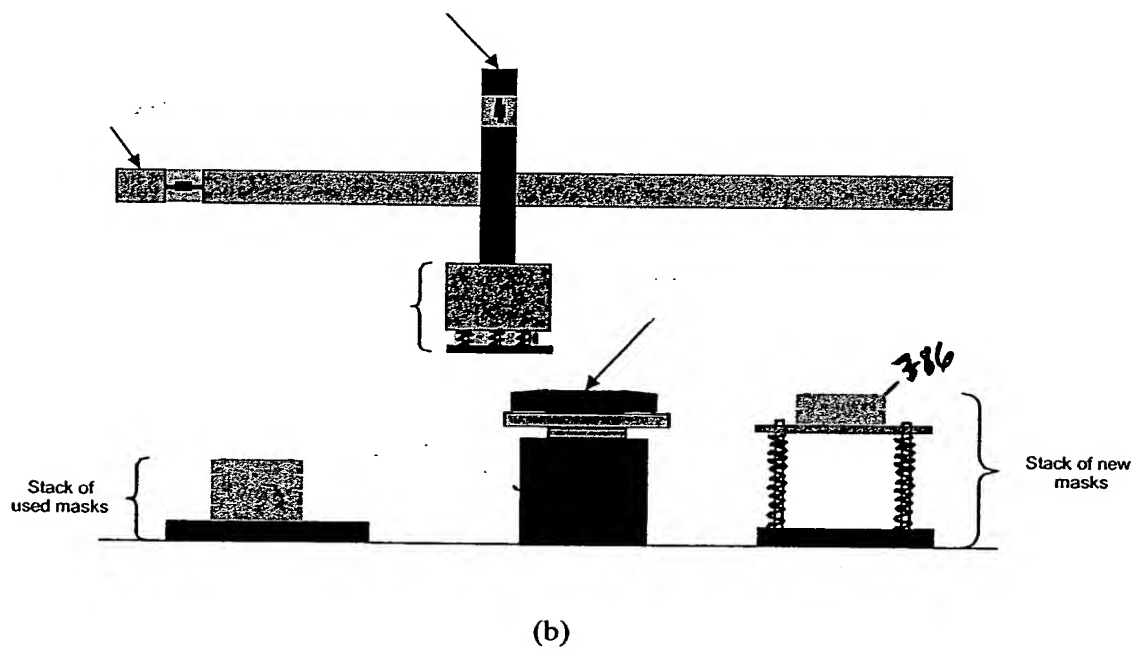
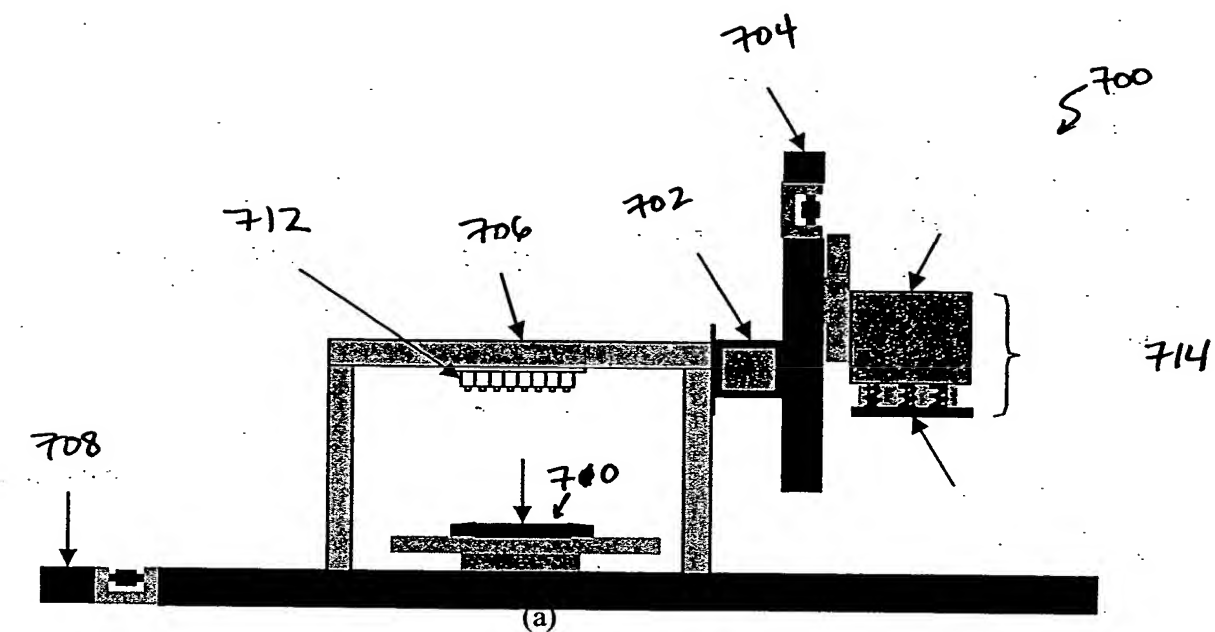


Figure 49

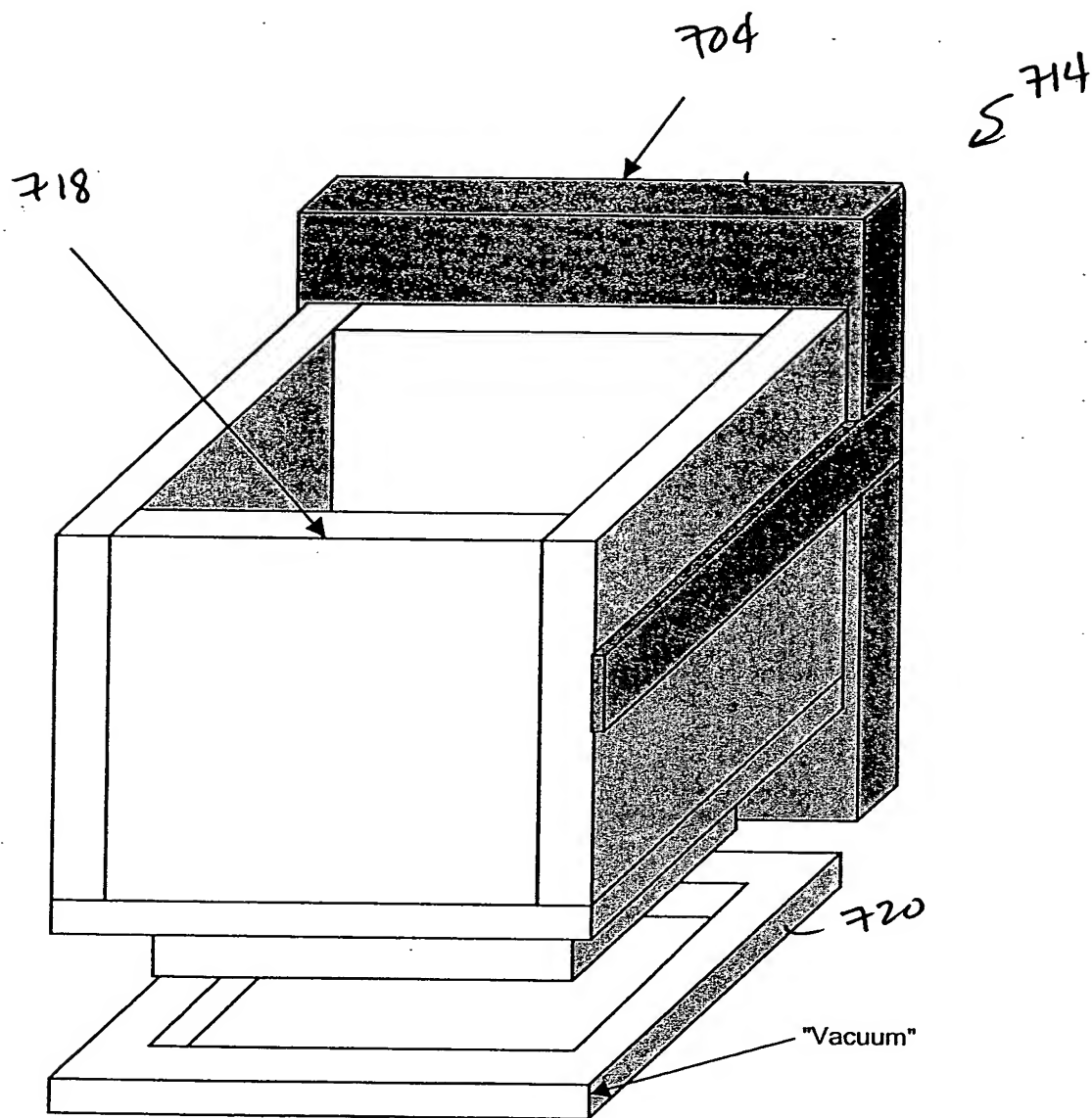


Figure 50

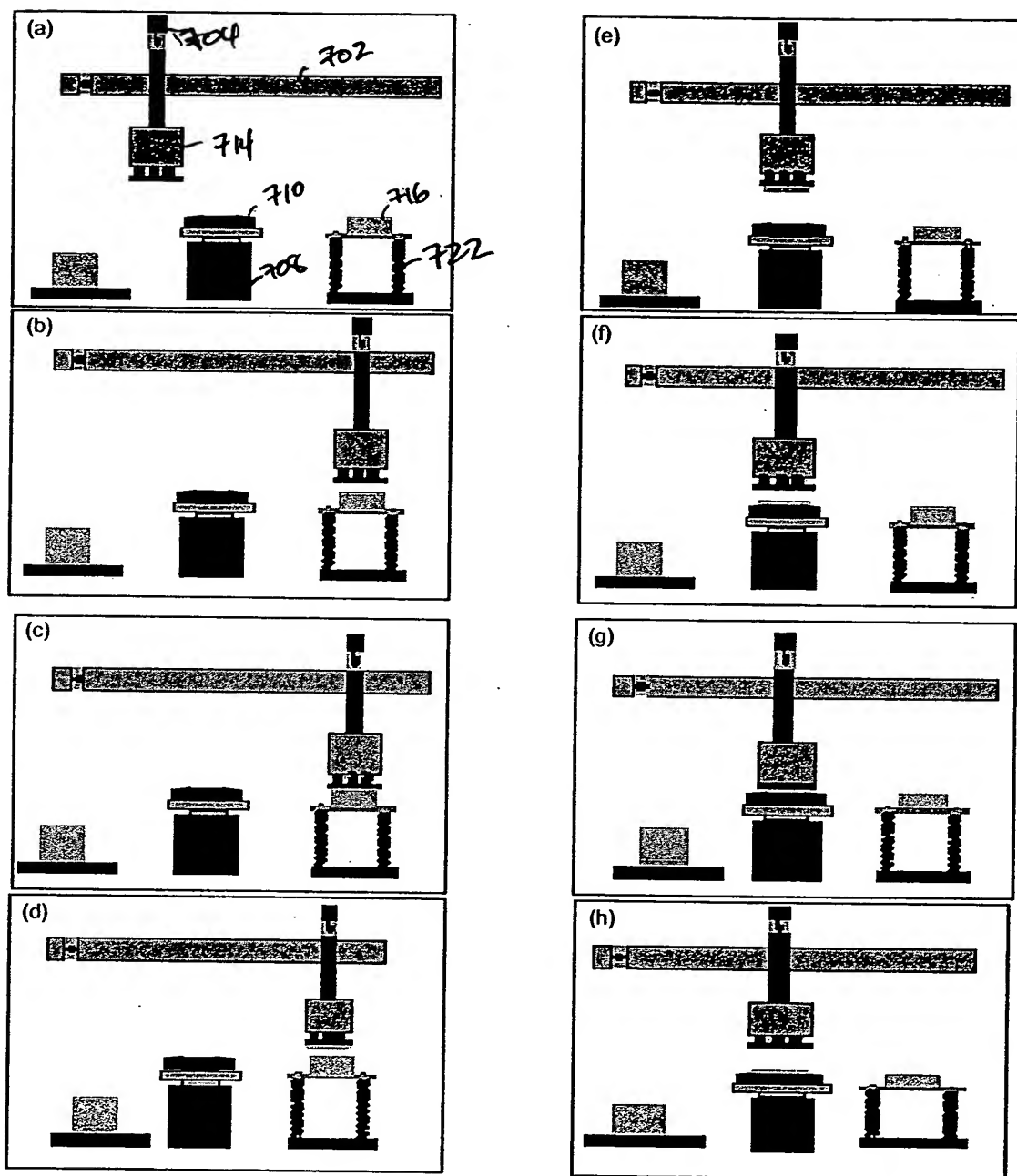


Figure 51

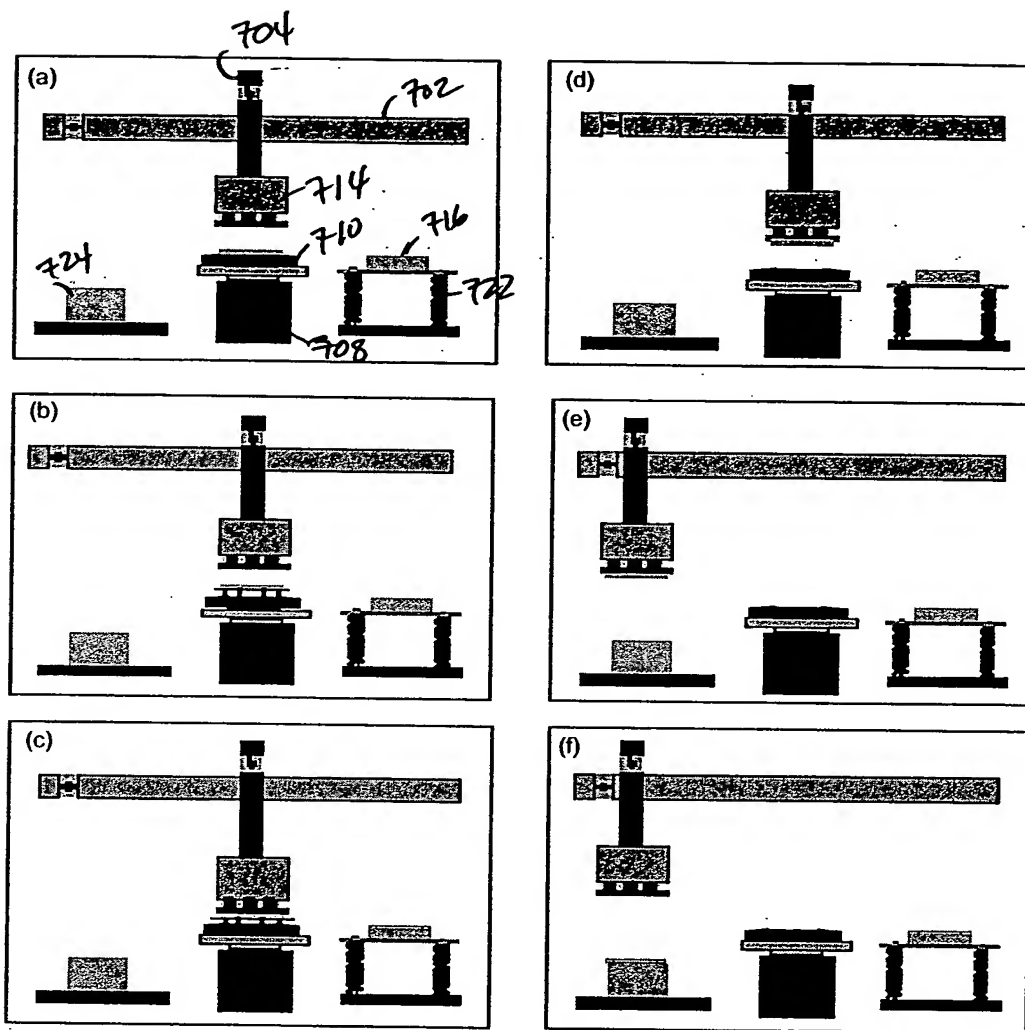


Figure 52